DOCUMENT RESUME

ED 304 779 EA 020 801

AUTHOR Richards, William T.
TITLE Seat Belts in School Buses: A Study by the Wisconsin Department of Public Instruction Prepared for the Wisconsin Legislature: S.B.7. Bulletin No. 9078.
INSTITUTION Wisconsin State Dept. of Public Instruction, Madison. Div. for School Financial Resources and Management Services.
PUB DATE 1 Jul 88
NOTE 86p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Bus Transportation; Educational Research; *Restraints (Vehicle Safety); *School Buses; Statistical Data; Student Transportation; *Traffic Safety
IDENTIFIERS *Wisconsin

ABSTRACT

The hypothesis of this study was that installation and use of seat belts in all large school buses are needed to prevent injuries and deaths to children in accidents as a result of no seat belts. Basic questions and summary arguments for and against the use of seat belts are listed. An analysis of research studies done on seat belts in school buses is included as well as various positions taken by other states, agencies, and research groups. Summary findings conclude that after 20 years of numerous studies of this issue there appeared to be no consensus among interested individuals and groups. Appendixes include: (1) a table of school bus accident data for Wisconsin; (2) 12 letters regarding views on the seat belt issue by senior officials of research and education institutes; (3) an article ("Lap Belts Fail to Reduce School Bus Passenger Injuries"); and (4) Wisconsin Briefs: LRB-86-WB-7 and LRB-87-WB-4. (SI)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

L. S. Harmatuck

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

EA 020 801

Seat Belts In School Buses:

A Study by the Wisconsin Department of Public Instruction

Prepared for the Wisconsin Legislature: S.B. 7

William T. Richards, Ph.D.

Transportation Consultant
Bureau for School Management Services
and Federal Aids
Division for School Financial Resources and
Management Services

July 1, 1988

Wisconsin Department of Public Instruction
Herbert J. Grover, State Superintendent

This publication is available from:

Division for School Financial Resources and Management Services
Wisconsin Department of Public Instruction
125 South Webster Street
P.O. Box 7841
Madison, WI 53707-7841
(608) 267-9215

Bulletin No. 9078

The Wisconsin Department of Public Instruction does not discriminate on the basis of race, color, religion, sex, national origin, age, or handicap.

Table of Contents

	Sources	Page
I.	Introduction	1
II.	Questions Raised in Regard to the Issue	1-2
III.	Hypothesis for the Study of Seat Belts in Large School Buses	2
IV.	Basic Questions to be Answered by This Study	2
V.	Summary Arguments for the Use of Seat Belts in Large School Buses	3
VI.	Summary Arguments Against the Use of Seat Belts in Large School Buses	3-4
VII.	School Buses and Seat Belts: A Discussion	5-6
VIII.	National Highway Traffic Safety Administration	7
IX.	National Safety Council	7
X.	National School Transportation Association	7
XI.	Canadian Government	7-8
XII.	State of Arkansas	8
XIII.	State of New Jersey	8
XIV.	State of Minnesota	9
XV.	State of Maryland	9
XVI.	State of Alaska	9-11
XVII.	The Eugene Oregon School District	11
XVIII.	The Fairfax County School in Virginia	11
XIX.	The Tenth National Conference on School Transportation Held in May of 1985	12
XX.	A Consensus of Thinking from Existing Literature and Research	12-13
XXI.	Publication: "School Transportation Director, Volume 8, Number 4, February 24, 1988"	13-14
XXII.	Publication: "Safety Belts in School Buses," a Report by the United States Department of Transportation, National Highway Traffic Safety Administration, June, 1985	14
XXIII.	Publication: "School Bus Passenger Protection," by Dewayne M. Severy, Harrison Brink, and Jack D. Baird, Institute of Transportation on Traffic Engineering, University of California, Los Angeles, CA, January 1967	15-16
XXIV.	"California Seat Belt Study"	16-20
XXV.	"Should School Buses Carry Seat Belts?" From the Journal of American Assurance, Fourth Quarter, 1985	21-23
XXVI.	Insurance Institute for Highway Safety, The Highway Loss Reduction Status Report, "School Buses and Seat Belts," Volume 20, Number 5, May 11, 1985	24-25
XXVII.	"School Buses Are Called Safest Surface Vehicles" From: The New York Times, Thursday, May 19, 1968	26-28
XXVIII.	Accent on Safety A History of the National Conferences on School Transportation 1939-1985	29-30
XXIX.	Findings	31
XXX.	Summary	32-33
XXXI.	Conclusions	34
XXXII.	Appendices	35

Introduction

The mandatory seat belt use law became effective on December 1, 1987. The law was numbered, Senate Bill 7. Within this law there were a number of exemptions. Large school buses, of 10,000 pounds or more, are still exempt from the installation and use of seat belts. School buses (under 10,000 pounds) are equipped with seat belts, and students must use them. School bus drivers, in small (under 10,000 pounds), and large (over 10,000 pounds) school buses, must use their seat belts. This legislation (Senate Bill 7) directed the Department of Public Instruction (DPI) to study the feasibility of installing and using seat belts in all school buses, large and small.

With these directions, the DPI has developed such a study which analyzes the major body of research and literature which pertains to this issue.

Questions Raised in Regard to the Issue

Throughout the United States and other countries, a great debate has taken place for at least the last twenty years, and continues, in regard to the installation and use of seat belts for students on large school buses (over 10,000 pounds). The heart of the issue appears to center around such questions:

1. Is there such a need (Is there a problem?)?
2. If there is a need, can it be described and documented?
3. If there clearly is a problem with school bus accidents, are these injuries and deaths a result of or contributed to by the lack of the installation and use of seat belts?
4. Where seat belts have been installed, and used in school buses, have they helped prevent serious injuries, and death?
5. Do seat belts in school buses contribute to more serious injuries and deaths?
6. How has past and present research of the "problem" made an impact on the installation and use of seat belts in school buses?
7. Why have 49 of the 50 states to date not passed mandatory laws to install, and use seat belts in large school buses?
8. Are there other or better ways (other than seat belts) to protect school children in school buses?
9. Are economic costs the sole factor to date in preventing the installation and use of seat belts in large school buses?
10. Whose responsibility is it to bring the results of valid, reliable research information to law-makers and governmental agencies, so that good public policy can be developed for the safety

and welfare of our children? What are the best ways that the "truth" can be brought to those most influential people in developing good public policy for the protection of the general public as a whole?

Hypothesis for the Study of Seat Belts in Large School Buses

The installation and use of seat belts in all large school buses is needed to prevent injuries and deaths to children in accidents as a result of no seat belts.

Basic Questions To Be Answered By This Study

1. Should seat belts be installed in all new school buses?
2. Should school buses now operating be retrofitted with seat belts?

   Those manufactured after the 1977 Federal Standards?

   Those manufactured before the 1977 Federal Standards?

   What factors need to be considered in making these decisions?
3. Are there alternative safety features for large school buses which could have greater potential for preventing injuries and fatalities than seat belts?
4. Have the various studies of seat belts, versus non use of seat belts in large school buses, proven the merit of the idea?
5. Has the research proven to date that there is a real need for seat belts in large school buses?
6. Is installing seat belts in large school buses a worthwhile investment in terms of increased safety for students?
7. To date, why aren't belts installed in large school buses throughout the United States? Note: Only one state to date, New York, requires all new buses constructed after July 1, 1987, must have seat belts; but their use is voluntary.
8. What are the findings from research in regard to the use of seat belts in large school buses?
9. What are the recommendations in regard to seat belts in large school buses, as made by national research groups, and national and state safety organizations?

Summary Arguments for the Use of Seat Belts in Large School Buses

1. Children use seat belts in passenger cars, so they should also use them in all school buses.
2. Small school buses have seat belts and passengers are required to use them, so large school buses should have the same requirements.
3. Adults should be consistent in requiring seat belts in all motor vehicles, including large school buses.
4. Seat belts in large school buses will help prevent minor injuries, and lessen serious injuries.
5. Seat belts will prevent deaths in large school buses.
6. School bus drivers are furnished with and are required to use a seat belt, so all passengers should also.
7. All safety precautions possible (including seat belts) should be used in all size school buses.
8. Seat belts will provide a safer environment, versus only compartmentalization in school bus construction.
9. Children will be held in a fixed position by seat belts, and thus this will improve student behavior which enhances a safer driving environment for the school bus driver.
10. The inclusion and use of seat belts in large school buses is a good investment because this is yet the missing ingredient in insuring the safest possible environment for pupil transportation.

Summary Arguments Against the Use of Seat Belts in Large School Buses

1. Increase costs for existing fleets of large school buses, due to installation costs.
2. Increase the initial purchase costs of new large school buses.
3. Could not retrofit buses built before April 1, 1977, because of the construction of those buses.
4. Would lose seating space because seat belt requirements would require greater spaces for passengers.
5. Would need to charge increased costs to taxpayers and/or riders.
6. Would cause increased maintenance costs for the school buses.
7. May develop liability issues when seat belts, are used or not used, by students, which may contribute to injuries during a school bus accident.

8. Would be difficult and expensive to monitor the use and non-use of seat belts in large school buses.

9. School districts might be held liable for use and non-use of seat belts as a result of accidents whereby passengers are injured or killed.

10. Use of seat belts "might" contribute to injury and death of "passenger-children."

Analysis of Research Studies Done to Date on Seat Belts in School Buses

Title: "School Buses and Seat Belts: A Discussion"

Institution: Alaska State Department of Education, Juneau, Alaska.

Publishing Date: August, 1985.

1. Reasons for not installing seat belts in large school buses:

   School buses are constructed much differently than automobiles in terms of:

   — the locations of doors and instrument panels relative to passengers

   — outer construction

   — seat design and padding

   — visibility of school buses by other motor vehicles on the road;

   — thus, there is not the same need.

2. Under current regulations, bus seats are required to be constructed safely in a manner that wearing seat belts may be more likely to increase injuries, rather than decrease them.

3. Several state and national organizations concerned with safety and school bus transportation have already found that currently large school bus standards provide adequate protection, so seat belts would not improve passenger safety significantly.

4. School buses have only two doors, so passengers aren't likely to be ejected through the doors, as they are in passenger automobiles.

5. School buses do not have sharp objects in their seat compartment areas, like automobiles (for passengers to strike) such as:
   steering wheels, dashboards, and door handles (and window) protruding into the passenger compartments.
   Note: Only the school bus driver is threatened by these objects, and it is mandated that school bus drivers must use seat belts, in all sizes of school buses (small and large).

6. Passengers in school buses, during an impact of a crash, are protected by padding on seats, seat backs, sides, and the aisles themselves provide space protection.

7. The outer construction of motor vehicles and school buses are different; school buses have a rib cage, while motor vehicles have little reinforcement.

8. School buses are larger, heavier, and the compartment level for school bus passengers is above the bumper level of motor vehicles, which makes it a "safety" compartment in which to ride, compared to an automobile. Thus, this is the "compartmentalization" concept.

9. School buses are much more easily seen by other motor vehicle drivers, because they are painted bright yellow, have flashing lights, special markings, and travel at comparatively lower speeds.

10. Other drivers may be more cautious when approaching, or passing school buses.

11. In 1977 the federal government required as of April 1 that:

    a. All seats be designed to meet specific spacing requirements.

    b. Seats be fully padded, front and back.

    c. School bus bodies be strengthened to withstand heavy impacts from the front, rear, and side.

    d. Improvements were required in school bus roofs to handle possible rollovers, which may occur in crashes.

    e. Other improvements in school bus construction were introduced in order to improve fuel tanks, fuel lines, and to lessen the possibility of fuel spillage during collision.

12. Compartmentalization creates a "safety pocket" for each passenger, because of the padding on the seats, front and back:

    — this distributes the force of any impact.

    — but if a child would be lap-belted, the child's hips could act as a fulcrum, throwing the upper body with great force upon impact.

    — the Southwest Research Institute in 1977 showed that 40 inches or more of unobstructed space is required in front of a lap-belted passenger to avoid upper body and head injuries.

    They found in their research that since school bus seats are closely spaced (less than the 40 inches or more) that a lap-belted child's throat or head will most likely strike the back of the seat ahead, during a crash. When this happens, the head or throat would receive all the forces of the impact and could result in severe physical injuries.

Various Positions Taken By Other States, Agencies, and Research Groups

National Highway Traffic Safety Administration

In an Issue Paper, AS-806-000, dated September 1981, it was stated: "The National Highway Traffic Safety Administration agrees that children should be protected on school buses. Improving the seating compartment eliminates the need for seat belts and provides sufficient crash protection."

National Safety Council

A policy statement, "Protecting Pupil Passengers in School Buses," dated June 28, 1984, stated: "The Council recommends that until further research and testing demonstrate that pupils will be safer by the installation of seat belts in school buses, passive protection provided by compartmentalization, as required by the current (1977) federal standard on school bus seating and crash protection, protects seated pupil passengers in school buses with gross vehicles with ratings (GVWR), greater than 10,000 pounds."

National School Transportation Association

In the Spring of 1984 a special edition of "National School Bus Report" the National School Transportation Association (NSTA) through its Board of Directors stated: "Those of us who work with the children and school buses every day feel that every new item that is added or changed on school buses should be well tested and engineered, prior to being mandated as a regulation. That is why NSTA will continue to support the compartmentalization concept until documented research establishes that seat belts on school buses will raise the level of protection for the occupants."

Canadian Government

In 1984 the Canadian government sponsored crash testing to determine the effectiveness of seat belts in three sizes of school buses. One of their findings indicated that in some crashes belted passengers suffered more severe injuries than those not belted. The results of this research was reported on December 19, 1984, in the publication entitled: "Bulletin". This publication is produced by the Supply and Services Division of the Canadian government; another source of reporting was a February 1985, technical memorandum on automotive safety entitled, "School Bus Collision Tests," published by Transport Canada of the Canadian government.

Some of the main findings stated were:

"Transport Canada has reaffirmed that the safety features Canada (same as U.S. Federal Motor Vehicle Safety Standards) has incorporated into its school buses: well padded, high-backed, energy-absorbing seats, speed at controlled intervals – provided a safe environment without seat belts. The use of lap-belted passengers in any of the three sizes of recent model school buses which were tested may result in more severe head and neck injuries for a belted occupant than for an unbelted one in a severe frontal collision."

State of Arkansas

Because of a school bus crash on March 25, 1983, in Jonesboro, Arkansas, which killed nine people, including four students, a study was done in Arkansas. The Arkansas legislature studied whether to install seat belts in school buses. Within a September 20, 1984, report: "Feasibility of Requiring School Districts to Install Seat Belts on School Buses," the Arkansas Legislative Council concluded:

"It appears that based on the costs, the lack of data indicating a great fatality decline with the installation of seat belts, the possible dangers which could arise from the installation of the seat belts themselves, and the outstanding safety records of school buses in general, the issue of seat belts in school buses could be left as a decision to be made by individual school districts and should not be mandated by the legislature."

State of New Jersey

A variety of independent groups in New Jersey have studied the issue of seat belts in large school buses for the past 20 years. A letter written by the New Jersey Department of Education summarized its view of the research when it stated:

"In any decision-making process involving the safety and well being of transported students, the bus internal and external safety environment must be carefully analyzed. Questions should be raised such as, "Is what we are proposing more safe, less safe, or as safe as what we already have? It is apparent that there still are too many safety trade-offs that, under highly critical questioning, prohibit mandated seat belts at this time."

State of Minnesota

The Minnesota Legislature in 1984 created a task force as a result of concerns about school bus safety after fatal school bus crashes. As a result of the task force study, its findings recommended against mandating seat belts in school buses.

State of Maryland

It was concluded by the Maryland Department of Education that seat belts would not improve the safety of pupils, and they could present hazards to their safety. This same department in its publication "Concerns About Seat Belts on School Buses" (dated January 1985) stated the following findings:

"If the bus rolls over on its side or roof during an accident, passengers may suffer serious injuries when releasing their seat belts because the bus roof would be three to four feet from their heads. Also, young children may find it difficult to unfasten a seat belt because of suspended weight. If the school bus catches fire, particularly with unconscious children aboard, rescuers may not have enough time to release seat belts for as many as 60 children."

State of Alaska

1. In 1983 the Alaska Department of Education appointed a committee of school bus company representatives and school transportation officers to study school bus safety issues. This same committee issued a resolution in February of 1985 which since has been adopted by the Alaska Association for Pupil Transportation and the Alaska School Transportation Association. This resolution stated:

   "The Alaska School Bus Safety Committee is agreed in its opinion that no legislative or regulatory action be taken in the State of Alaska to require seat belts on school buses until an authoritative body of test data has been produced showing conclusively that the overall safety of the ridership on pupil transportation buses is significantly enhanced."

2. The Real Concern

   In 1983 the National Safety Council reported 55 pupils killed in bus accidents nationwide. It was also found that 45 of the fatalities were pupils approaching or leaving a loading zone, while 10 pupils of the 55 were killed in the buses in the accidents reported.

   Evidence did not show that the 10 fatalities inside the bus could have been prevented with seat belts.

Across the United States the vast majority of pupils injured and killed happen while they are either being loaded or unloaded on the buses. The loading zones are the areas where pupils wait for the bus in the morning to get on the bus, while the unloading zones are where the pupils get off the bus in the afternoon.

In the 1983 the National Safety Council reported it was found that more than 50% of the 45 pupils killed outside the bus were hit by the bus they had ridden, while the others were killed by motor vehicles which failed to stop for school buses when pupils were either being loaded or unloaded.

External (outside school buses) pupil transportation fatalities outnumber internal (inside school buses) pupil transportation fatalities 3 to 1.

Conclusion(s) of the Alaska State Department Study

1. The Alaska Department of Education concluded from the research evidence that—"it could not support seat belt use in school buses until further testing shows that it is safer than compartmentalization."
2. The Alaska Department of Education supports the position taken by the National Safety Council, and the National School Transportation Association, which is compartmentalization, versus no seat belts in large school buses.
3. The Alaska Department of Education supports the Alaska School Bus Safety Committee's resolution to encourage greater efforts to reduce accidents in loading and unloading zones.
4. Basic issues yet to be explored:

   Should seat belts be installed in all new school buses?

   Should post-standard (after April 1, 1977) school buses be retrofitted with seat belts?

   Should pre-standard (before April 1, 1977) school buses be retrofitted with seat belts?

5. Terminology

   Active Research:

   Refers to crash studies that simulate accidents using both belted and unbelted dummies to allow assessment of the relative safety of seat belts in accidents.

   Investigations:

   These are studies that examine statistics of actual accidents.

Discussions:

The largest body of literature is found from discussions on the school bus seat belt issue by local and state agencies attempting to find concrete evidence of what is preferred, safest. And most of this literature seems to summarize the findings and recommendations from crash studies, along with conclusions from selected investigations, and various experts' opinions on the large school bus seat belt issue.

The National Coalition for Seat Belts in School Buses (NCSSB)

In a letter to the Montgomery County (Maryland) Public Schools, this group expressed its recommendation in the following way: promote the installation of seat belts on school buses for three reasons:

1) Injury reduction
2) Educational habit carry-over is needed, from school bus to family car, to protect children from the number 1 killer – the automobile accident
3) Improved discipline for reduced driver error.

The Eugene Oregon, School District

As a result of a report released in 1986, it stated: "All new school buses purchased be equipped with 28-inch high seats having seat belts attached; and that all passengers, including adults, wear these belts."

The Fairfax County Schools in Virginia

They have recommended buying factory-installed seat belts in all school buses. But they recommended also that the use of the seat belts should be optional, because of the lack of specific test results which may not be available to tell if they are effective, or if the use of them could contribute to injuries. They believed that without this research evidence that litigation could result if a student(s) sustained a severe head injury which could be shown to be exacerbated by the use of seat belts.

The Tenth National Conference on School Transportation Held in May of 1985

Most state agencies responsible for pupil transportation have reviewed the literature in regard to the installation of seat belts in large school buses. These agencies have concluded that they should make no decision to do so, until the needed research and reporting of this evidence has been completed. In the search of the related literature and the seat belt research studies, there were no studies found which had been conducted by any of the State Departments of Education or Public Instruction in the U.S. It appears also that there are so few school bus accidents, whereby pupils are injured or killed within school buses, that it has been most difficult to study effects of no use of seat belts, versus the use of seat belts. Further, at the Tenth National Conference on School Transportation held in May of 1985, a number of groups in the field such as:

The National Association of State Directors of Pupil Transportation, the National Association of Pupil Transportation, the National School Transportation Association, the National Safety Council, the School Bus Manufacturers Institute, and Central Missouri State University made the following recommendations:

> "The local, state, and federal governments and the general public recognize the passive restraint system in school buses manufactured after April 1, 1977, has proven to be a more effective passenger protection system in school buses than the protection provided by seat belts; and that local, state, and federal governments discourage the mandatory installation and use of seat belts in school buses until such time that extensive and scientific research proves them to be more effective in injury prevention than the existing passive restraint systems."

A Consensus of Thinking from Existing Literature and Research

1. The studies done to date are inconclusive, and more studies of actual (school buses carrying children when experiencing accidents) experience of a significant number of school systems across the United States need to be conducted because to date it doesn't appear that there has been enough "experience" studied to make some rational decisions. For example, Wisconsin has had practically no experience yet with large school buses equipped with seat belts to study their accident experience, because only within the last year has one large school bus (we've been told) in the Milwaukee area been equipped with seat belts.
2. Some limited data to date appears to suggest that belted passengers may experience some injuries, due to the use of seat belts in frontal collisions.

3. In rollover accidents, "experts," on the whole, appear to agree that passengers using seat belts in an accident may have an advantage over passengers not using seat belts.

4. Some "experts" in the field suggest that it may be wise to preserve some options and to consider some prudent alternatives like:

   a. Equip all new buses with seat belts – which can be removed if more negative evidence is found.

   b. Purchase new school buses which are specially built to install seat belts, if so desired after purchase.

   c. Pre-standard buses (built before April 1, 1977) should not be retrofitted with seat belts, because they are not constructed to accommodate seat belts.

   d. The option to install seat belts in post standard buses (constructed after April 1, 1977) should be approached cautiously, because "experts" in the field do not seem to agree that this is feasible. After April 1, 1977, all large school buses were required to meet the following standards:

   (1) Additional riveting and fasteners placed closer together to strengthen the sheet metal panels which comprise the bus shell; this assists in preventing exposed sharp edges in bus accidents.

   (2) Bus roofs were required to be strengthened, so they cannot sink more than five and one eighth inches when a force equal to one and a half times the total bus weight is applied to the top; this can reduce the possibility of roof collapse during rollovers. It was found in pre-standard buses that often the body failed and then roofs would be crushed.

Publication: "School Transportation Director, Volume 8, Number 4, February 24, 1988"

1. Article: "Seat Belts No Factor in Danbury Accident"

   a. As a result of the examination of this September 14, 1987, accident, in Danbury, CT, it was found: "the seat belts did not add to or subtract from the injuries," according to a report by Walter E. Skowronski, director of finance and support services for the Danbury Board of Education, Danbury, CT.

   b. This report also indicated that all 24 people on this bus were injured in some way, but all the injuries were minor.

c. Fourteen of the passengers, including the driver and teacher aide, indicated they were wearing seat belts.

d. The bus was a 1987 Wayne 59-passenger vehicle which was a total loss for insurance purposes, but the report indicated: "It did appear to hold up very well in view of the force of impact."

e. The author of the report, Skowronski, stated: "As I recall from the research and discussion on seat belts, in this type of accident (broadside), the compartmentalized construction of the modern school bus was a bigger plus than the seat belts."

f. As a result of the minor injuries experienced by the passengers in looking at school time missed, seven students returned to school the next day, two missed one day, five missed two days, two missed three days, and six missed four days.

Publication: "Safety Belts In School Buses," a report by the United States Department of Transportation, National Highway Traffic Safety Administration, June, 1985.

1. This report states:

   a. In 1983, 42,589 people were killed in traffic accidents, while only 17 of these were school bus passengers.

   b. The question of the installation and use of seat belts in large school buses is complex.

   c. The test data and real world accident data (so far) indicates that school buses constructed after April 1, 1977, having compartmentalization, has worked extremely well to protect passengers.

   d. To date there is insufficient data to conclude that seat belts utilized in large school buses would increase passenger protection.

   e. This agency believes that seat belts are necessary and effective in small van type school buses (under 10,000 pounds), because they are so similar to passenger cars in terms of construction, size, and weights.

Publication: *School Bus Passenger Protection,* **by Derwyn M. Severy, Harrison Brink, and Jack D. Baird, Institute of Transportation and Traffic Engineering, University of California, Los Angeles, California, January, 1967**

1. This book describes three full-scale collision experiments involving school buses which used research techniques and engineering methodology designed to provide realistic and objective findings, related to school bus passenger safety.

2. The studies conducted included:

   a. a head-on collision between two fully loaded, moderate-sized school buses, each traveling 30 miles per hour.

   b. a stationary bus rear-ended by a passenger car, traveling at 60 miles per hour.

   c. a stationary bus impacted on its right side by a passenger car traveling 60 miles per hour.

   d. the main categories of focus in the studies were:

      (1) location and type of impact

      (2) structural integrity of vehicle

      (3) vehicle size

      (4) seat design

      (5) type of restraint or force moderator

      (6) type of safety glass

      (7) passenger size

      (8) standing versus seated passengers

      (9) passenger kinematics and interactions

      (10) forces sustained by passengers and many related factors.

   e. Conclusions and findings from this study:

      (1) all buses must include provisions for collision-resistant structure at the passenger car bumper height as well as at the heavy trunk bumper height.

      (2) bus design should insure the passenger compartment is securely attached to the frame of the bus by appropriately sized shear bolts at frequent intervals from front to rear and along both frame members.

(3) the new laminated glass having a high-energy interlayer with controlled adhesion, represents a substantial improvement for collision performance of windshields.

(4) tubular struts, protruding hand grips and similar protruding rigid structures should be eliminated.

(5) angular sections and small radii surfaces should be eliminated, and amplifying structures should be relocated.

(6) pop out windows, windows hinged at the top are not advised; glass should remain in place, even after sustaining head or shoulder impacts because this will serve to keep passengers' heads and limbs from being flailed through windows where they may encounter a far more abusive environment.

(7) in the research it was found that low-back seat units with seatback heights of less than 28 inches greatly increased the chances of injuries during school bus crashes.

(8) seat belt anchorages and seat cushions need to meet the Federal Motor Vehicle Safety Standards.

(9) school buses constructed before April 1, 1977, would need to have additional tubular structure for anchoring seat belts and would need separate floor attachments without adding stresses to the existing seat anchorages.

(10) seatback strength should include allowance for passengers thrown forward against the back rest.

California Seat Belt Study

1. To date post studies of seat belt use, or non use, have not proven their worth because of various variables involved.
2. Most experimental studies to date have been limited by design.
3. The qualitative and quantitative variables which have influenced the conclusions include:
   a. Pre- or post-1977 Federal Motor Vehicle Safety Standards (FMVSS) buses
   b. Car, bus, or fixed object impacts
   c. Front, side, rear or rollover accidents
   d. Large or small passengers
   e. Lap, shoulder, three point, or other restraint types

f. Restraint on or off.

There is a small data base existing in the United States to study the efficacy of seat belts in school buses. It is reported that there are approximately 130 school districts in the whole United State using seat belts in large school buses, while Wisconsin alone has 431 school districts with no installation nor use of seat belts in large school buses. These 130 school districts represent less than 0.2 percent of the total fleet of large school buses in the United States. Within the entire fleet of large school buses in the United States, accident data pointing to injuries and deaths are very sparse.

This particular research study looked at the following basic questions:

1. Can seat belts be compatible with and complement required compartmentalization features in all large school buses constructed after April 1, 1977 (Federal Standard: FMVSS)?
2. Based upon probable effects of seat belts on injuries and fatalities, should seat belts be required on post 1977 FMVSS school buses?
3. Pre-1977 FMVSS school buses?
4. Should other restraint and/or safety design strategies be followed?
5. What else can be done to finally resolve these issues?

Front, side, rear impact, and roll over accidents primarily were investigated. It was found that accidents were infrequent, were experienced at low speed, and were of the stop-and-go nature most routes. School buses often travel the same routes, every day, with the same driver, and make the same stops in rural residential, and arterial flows. These travel patterns help explain the preponderance of accident occurrences in which school buses are struck in the rear, or on the side by other vehicles, versus other kinds of accidents whereby school buses are striking other vehicles and other immovable objects (bridge abutments, culverts, trees, etc.).

Some of the major conclusions that these investigators came to include:

1. Research, testing, and accident statistics weigh against new lap belt installations for large school buses based upon "accident made probabilities and a factor for average severity in each accident made".
2. It appears to date that the "opinions and research results are by no means uniform, nor do they mount up heavily on either side of the issue."
3. Post attempts of testing and experimentation in the use of seat belts in large school buses have failed to come to conclusive conclusions of whether seat belts are helpful or detrimental in large school buses.

4. Without conclusive objective, valid, reliable experience and research in this area to date, major investments in legislation mandating installation and use of seat belts in large school buses could result in "ill-conceived" public policy.

5. Twenty eight school districts in the United States, known to have installed seat belts in their large school buses were contacted for this particular study, and it was still found that there was too little accident experience to study in these accidents to conclude either way whether it's worthwhile or not to have them equipped with seat belts.

6. The investigators stated in their findings that: "existing research, testing, and accident statistics weigh against new seat belt policies for large school buses when taking into consideration mode probabilities and a factor for average severity in each accident mode."

7. Researchers to date on this seat belt issue in large school buses do not seem to have discovered "mounting research results" on either side of the issue, for or against.

8. It has appeared that many attempts in the past 20 years have been made to study the issue of seat belts in large school buses, but these studies collectively have not revealed any "compelling conclusions" which would develop sound public policy to make major program investments in installing seat belts and using them in large school buses, versus the present compartmentalization provisions that have been constructed into all large school buses since April 1, 1977.

9. Some of the major specific findings in their study include:

   a. Over five times as many accidents involving side impacts occur than those involving frontal impacts.

   b. Three times as many rear impact accidents occur than frontal impacts.

   c. Accident severity factors (the likelihood that an accident will involve some injury) are about one-half and two thirds as high for side and rear-impact respectively, versus front end impacts.

      Note: It appears from these research findings that school buses are struck or sideswiped much more often than they strike other objects or vehicles. This may be because most bus operations have frequent stops and turns while traveling at relatively slow speeds.

   d. Greater injury severity seems to occur from front end impacts.

   e. The most severe injuries appear to occur in roll over accidents, but these kinds of accidents occur least frequently.

f. In front end impacts, benefits of "riding down" the chassis deceleration with seat belts may be offset with the higher head and upper body accelerations caused by "jackknifing" and striking seat backs and other objects.

g. The principal danger in side impact accident cases appears to be secondary collision with sides of the bus or other passengers; thus, it's suggested in the findings, that seat belts could alleviate this in at least some cases, but to date there does not seem to be a current system of seat belts or containment means to deal effectively with this hazardous problem.

h. When there are rear impact cases, then "yielding" seat backs may be of the greatest benefit.

i. Rear facing seats could improve front impact performance, but could increase injury exposure in rear impacts,which occur three times as often as compared to front end collisions.

These investigators believed that the California data may have shed more light on this issue of seat belts in large school buses than the national fatality data which has been available to date. The fatality studies to date appear to be based on (upon the whole) insignificant data and reflect only the highest impact. These national studies therefore are not a good representation of the real and more frequently encountered hazards that pupil passengers face. When fatalities were experienced in these studies, it appeared questionable whether any restraint or containment strategy could have prevented these fatalities.

These researchers in the California study also made these observations in their findings:

1. The available national research done to date seems to regard seat belts as "add-on" safety features in themselves, versus the "compartmentalization" structure.

2. If school buses constructed after April 1, 1988, were retrofitted with seat belts, it would not be foreseen that major structural changes would be made which would have prohibitive impacts on the capacity of the whole school bus fleet.

3. A primary assumption (to gain their favorable impact) in the seat belt issue is that they would be fully utilized, but while attempting to achieve this goal of full utilization, would involve a major investment upon its own through probably the need for special monitors on all buses.

In conclusion, these investigators indicated that the following kinds of research need to be done yet before a final objective public policy can be developed on the issue of seat belts in large school buses.

1. Containment or restraint systems specifically designed for high frequency side impacts.

2. Development of improved belt and anchor system performance and seat design standards assuming some districts will require belts.

3. Analysis and experimentation with acceleration/time properties of various accident scenarios.

4. Development of standard driving cycles for school buses that can be used for analysis of safety systems.

5. Development of methodology to correlate extensive automotive safety research with the differing kinetic energy/acceleration rate conditions for buses.

6. Analysis of other states accident databases to augment/validate conclusions.

Should School Buses Carry Seat Belts?

(from *The Journal of American Assurance*, Fourth Quarter, 1985)

This article suggested that a greater effort for safety should be made outside of school buses. It is believed that the problems of existing injuries and the few fatalities that happen do not occur in the buses, but they happen outside buses, usually during unloading children and sometimes while loading children upon school buses.

It was stated in this article that the National Highway Traffic Safety Administration (NHTSA) has indicated:

> "In view of the effectiveness of the current safety standards, and the excellent safety record of school buses generally, we do not believe that a federal requirement for safety belts in large school buses is warranted." (NHTSA Report, June, 1985)

All school buses manufactured after April 1, 1977, must meet the aforementioned standards which ensure rollover crash protection, minimizes crushed roofs, and permits students to escape through the emergency exits. Also included in these standards are compartmentalization which requires strengthened seats capable of withstanding crash forces. This compartmentalization also develops a protective place for students between seats, with the seats provided with protective padding on the front, rear and top ridges of the seats. The seats are also constructed to be higher, which helps prevent whiplash in rear impacts. These padded seats are constructed in all large school buses after April 1, 1977, which helps reduce injuries in frontal impacts, and helps passengers absorb crash forces in more forgiving ways.

The NHTSA standards do not disallow or discourage local school districts from installing and using seat belts, if they wish to do so. From the available research done to date, NHTSA does not believe mandating seat belts in large school buses is warranted; therefore, to date this federal agency has not promulgated rules mandating the installation of seat belts in large school buses, nor exactly how they should be installed.

The school bus is not a motor vehicle passenger car, and shouldn't be considered as such. School buses have their own unique construction, identity, color, design (it's not a fast vehicle), and school children do not sit near doors whereby they could be ejected from the vehicle.

Illegal passing of school buses causes a significant number of injuries and traffic fatalities; this is an area of concern which needs a strong educational effect to reach motor vehicle operators. The Insurance Institute for Highway Safety (IIHS) utilizing the Texas Transportation Institute did a pilot study of two urban school districts which found on the average a school bus was passed illegally seven

times per day. This study was reported in the IIHS Status Report, May 11, 1985, Volume 20, Number 5.

The Texas Legislature mandated that the Texas Transportation Institute study school bus accidents caused specifically by motor vehicles not stopping for school buses. In part of this study, they evaluated the effects of adding a "swing-out stop-arm," activated when red loading lights were illuminated revealed that the stop arms lowered the probability of illegal passing by 30 percent or more. This research group assumed from this study that the 30% reduction in illegal passing would translate into being 50 percent effective in reducing other motor vehicles from colliding with school buses, and their passengers outside of the school buses while being loaded or unloaded.

It was indicated in the report that the National Safety Council in its 1985 July/August *Traffic Safety* magazine that many motorists may ignore warnings to stop for school buses because perhaps most jurisdictions may not successfully prosecute illegal passers because school bus operators are unable to make positive identification of the vehicle in violation. A concentrated effort needs to be made to resolve this situation.

Parents can be a great part of the solution. Parents can model safe and legal behavior by observing their local school districts school bus safety rules and policies. Parents also need to directly instruct their children in the fact that traffic may not always stop when it should and therefore their children need to always look and be careful when approaching or leaving the school bus. Parents also need to warn their children along with safety instruction in their schools that motor vehicle operators have decreased visibility in poor weather, and this means that their children must be especially careful and cautious when crossing in front or behind a school bus. The above recommendations are made as a result of many studies throughout the Untied States which indicated that the vast majority of school bus accidents happen in loading and unloading zones, outside the school bus.

In 1983 NHTSA noted that the Safety Board said: "The installation of seat belts in large school buses would impose a financial burden on all school bus purchasers, regardless of whether they intend to install seat belts in buses." They also noted local school districts may choose to install and use seat belts in large school buses. But simply put, the research to date does not identify nor define a problem and is inconclusive in terms of advocating installation and use of seat belts for solving a problem that may not even exist.

This article also cites the finding of Transport Canada's research in 1984 in which they conducted barrier crash tests to determine the adequacy of occupant protection regulations required in large school buses and this research found that there was "excellent protection" provided through compartmentalization construction, without the installation and use of seat belts. They found in the simulated crashes they conducted that the passive restraint system (compartmentalization) provides

"excellent protection" for passengers, while if seat belts had been utilized in frontal crashes, it may have resulted in more severe head and neck injuries for belted occupants. These tests did not explore side impact nor rollover crashes, so more research of these kinds of crashes would seem warranted.

NHTSA's 1985 report on seat belts in large school buses recommended that rather than spending money on seat belts that the installation of special mirrors for large school buses be done so that bus drivers would be helped to see small children in front or behind buses, implement improvement of school bus driver education, and even better maintenance of large school buses would be a better investment in preventing injuries and traffic fatalities for children being transported in large school buses. Other specifics which appear to have a greater pay-off for school bus safety include initial better selection, licensing, and training of school bus drivers; better inspection of large school buses and maintenance requirements; and improved education of passengers for "on-bus" behavior, bus stop behavior, and emergency procedures for school bus passengers. Appropriate supervision of school bus transportation will serve to enhance the safety of children being transported in a safe manner. Part of this supervision at the local level needs to include evaluating the need for compliance with all applicable large school bus standards, and to check to make sure that all vehicle components are functioning properly.

Also, school bus drivers need to be able to focus their main attention on operating their buses safely. Here parents can be of great help. Parents and other citizens can be encouraged to participate in a bus monitoring program, whereby drivers of large school buses are relieved of trying to monitor pupil behavior while they are simultaneously attempting to drive their buses safely and be aware of all traffic situations.

A volunteer interested citizen and parent monitoring program for large school buses could provide the following kinds of service:

1. Help children cross streets or highways at bus stops safely.
2. Maintain appropriate, safe student passenger behavior on the buses.
3. Assist in emergencies.
4. Observe the bus driver to make suggestions to improve her/his driving habits.

The planning for and the implementation of safe school bus transportation is not only the business of each local school district, but it should be a concern of all interested citizens, parents, teachers, school administrators, and legislators.

From voluminous amounts of research on this safety issue, the problem does not appear to be inside the bus—but outside the bus where children are injured and killed.

Insurance Institute for Highway Safety

The Highway Loss Reduction Status Report

School Buses and Seat Belts

Volume 20, Number 5, May 11, 1985

Note: "*The Insurance Institute for Highway Safety* (IIHS) is an independent, nonprofit, scientific and educational organization. It is dedicated to reducing losses-deaths, injuries and property damages—resulting from crashes on the nation's highways. The Institute is supported by the American Insurance Highway Safety Association, the American Insurers Highway Safety Alliance, the National Association of Independent Insurers Safety Association and several individual insurance companies."

The transportation of school children is an annual huge enterprise. On a daily basis throughout the United States, some 390,000 school buses travel more than three million miles, transporting some 21,500,000 children to and from school, to athletic events, and on field trips. School buses are one of the safest means of transportation in the U.S. But still a growing number of parents and other concerned citizens are aware of the advantages of wearing seat belts in passenger cars, and they sincerely raise the question of making school bus transportation possibly even safer by installing and using seat belts in large school buses (more than 10,000 pounds). So there is a movement from some people and some groups to require school districts across the country to add seat lap belts for their children's protection, while still others believe sincerely that such an action could create more injuries in bus crashes. It appears that this debate has ensued for some twenty years.

At the publication of this document (5-11-85) ,required seat belts in large school buses as a result of parent groups lobbying state capitols and school boards, had not been legislated in any state in the U.S.

As far back as 1973, the National Highway Traffic Safety Administration (NHTA) began considering improving school bus safety standards. They eventually proposed raising the backs of seats in school buses to 28 inches which is about the height of an extended head rest in most passenger cars. At that time they also considered requiring lap seat belts, and then they considered a requirement of lap and shoulder belts, but they came to the conclusion that this would not be "feasible." By 1974 NHTSA abandoned the idea of requiring seat belts because of "practical objections", and then came to the conclusion that they would establish standards (to become effective for all large school buses) that were to be constructed after April 1, 1977. The report stated that NHTSA changed its position because it "determined that a passive system of occupant containment by the seating system or a restraining barrier offers the most reliable crash protection in a school bus situation." This agency (NHTSA) through its engineers also came to the conclusion: "by raising the backs of seats, making

them more yielding, and requiring padding to protect a child's knees,torso, head, and face that the crash load would be spread more evenly over a child's body." These engineers also cautioned that the use of a lap belt could cause children to double over the belt in a frontal crash, pivot forward, and strike their heads on the back of the seat in the front of them. This action, as aforementioned, would concentrate the force of the crash load on children's heads and faces, which in turn would increase the risk of head injury.

The National Transportation Safety Board (NTSA) too has studied the issue of seat belts in large school buses. In 1983 the NTSA believed that there was still insufficient research data to justify the mandating of the requirement of seat lap belts in large school buses. This same agency came to the conclusion, in 1983, that lax vehicle maintenance and poor driver training practices may contribute to or cause serious school bus crashes. And the NTSA recommended: "that states tighten up their inspection procedures, and require improved driver education, licensing, and certification for school bus drivers." Fairfax County, Virginia, spent $100,000 studying seat belt use in large school buses and came to the conclusion they wouldn't install them."

The group that advocates seat lap belts in large school buses believe it's educational. They can't see how it makes sense to require seat belts in passenger cars for children, and not in all school buses, including large school buses. This group wants no injuries and deaths in school buses, and believes, that seat belts could be one more step to achieve this worthy goal. One of the problem areas yet seems to be that there appears to be no correlation between seat belt use in large school buses and passenger cars; at least there appears to be no evidence, yet, in the research that has been done to date which shows a positive correlation.

In conclusion from research NHTSA has done, and from its analysis of other research studies dealing with this issue, to date this research group does not advocate public policy which would promulgate rules and legislation which would mandate the installation and use of seat belts in large school buses.

"School Buses Are Called Safest Surface Vehicles"

From: The New York Times
Thursday, May 19, 1988

The crash that killed 27 passengers in a school bus sponsored church trip prompted this article. Yet, it was stated that federal, state and independent safety experts believe that "school buses are the nation's safest mode of surface transportation." But they also believe that there is a problem with older large school buses (pre-standard before April 1, 1977) sold to private groups or individuals which don't need to meet federal standards.

In the Kentucky accident a pick-up truck being driven the wrong way on the interstate system struck the school bus head on. The driver of the pick-up truck was driving drunk (24% B.A.C.), and has been charged with 27 counts of murder. These were children who were killed.

Jan Holmes, coordinator of school bus transportation for the National Safety Council, a non-profit organization, was quoted as saying, "School buses are one of the safest forms of transportation."

The National Highway Traffic Safety Administration has reported that "school buses are the safest form of surface transportation in the nation."

Commander Chuck Allen of the California Highway Patrol indicated that since 1983 California has had one pupil killed while their school buses have traveled nearly one billion miles.

Lindsey Griffin, a program officer for the National Academy of Sciences, stated in this article that from 1980 to 1985 only 15 passengers in school buses were killed which were operated by or for school districts.

Karen Finkel, director of the National School Transportation Association, said, "There are 350,000 school buses in the U.S. which travel 3.7 billion miles per year while transporting 21.7 million pupils daily. When you look at the numbers, school buses are extremely safe." Within this article, Mr. Griffin indicated that "about 148 people" are killed each year in accidents related to school buses; he also indicated that most of the 148 people killed were either pedestrians or people in the other vehicles. The author of this New York Times article, Dennis Hevesi, concludes: "Those statistics point to the effectiveness of the revisions for school buses that were enacted into the Federal Motor Vehicle Safety Standards in 1977."

These 1977 standards were discussed in more detail through a spokesman, Joe Collins, from the National Highway Traffic Safety Administration (NHTSA). Within the article Joe Collins was quoted as saying that school bus roofs were required to be strengthened "to reduce the likelihood of roof collapse," if the bus overturns. And he also said the body panel joints were strengthened in order "to reduce lacerative injuries to occupants caused by the sharp edges of the body panels that tear loose

in crashes," and compartmentalization through the use of "well-padded and constructed seats." These same standards (for all school buses constructed after April 1, 1977) require an enclosure of protective measures (metal baskets) which surround fuel tanks which do ensure "the integrity of the fuel system" in all school buses. It was indicated that manufacturers of school buses have met this standard requirement by constructing a steel cage around the fuel tanks.

It was cited in this article that officials in Kentucky indicated that in the case of the 27 passengers who died from smoke inhalation in this crash as a result of the gas tank blowing up that this gas tank was not enclosed, and this school bus obviously didn't meet the post April 1, 1977, higher standards for the construction of school buses.

These 1977 standards are referred to as the "New Standards," yet for school buses. The director, Barry Sweedler, of the safety programs for the National Transportation Board, stated that these New Standards "have significantly improved the safety" of school buses.

Within this article, Mr. Sweedler also described the results of a 29-month study starting in 1983, in which at least one passenger was killed, as well as most of the serious accidents did occur. In this study there were 43 accidents in which 90% of the 1,100 student passengers experienced "at most minor injuries." In these accidents it was found that 13 passengers were killed, but "most were in positions that were intruded upon, by another vehicle or a bridge abutment."

Progress is being made in the acquisition of post standard (constructed after April 1, 1979) school buses by local public school districts. It was cited in the 1988 March issue of School Bus Fleet Magazine that in the year 1986 that 33.3% of the school buses used were built before April 1, 1977, but now in 1988 there are some 22.6%. This is a significant improvement in the acquisition and utilization of newer, safer school buses.

Local public school districts must purchase and operate their school buses under strict federal and state standards.

But school buses purchased and operated by private groups do not have to meet the standards that school operated buses and drivers do. In the Kentucky crash this was one of those situations which was not a school operated function. The contrast is that there are strict standards enforced for inspection of school buses and for licensing school bus drivers when schools are involved, versus the acquisition and use of such buses when acquired and utilized by private groups.

Schools sell their older buses to these private groups, and the utilization of these, older "pre-standard, April 1, 1977," continue to be of real concern to safety experts. It is stated quite candidly by the president of the American Bus Association, Norman Sherlock, when he stated, "These cast-off things are terrible, particularly since there is no Federal oversight or safety regulation of this equipment."

Mr. Scherlock indicated there were no exact figures available in regard to the number of accidents involving these buses, or for the number of those older buses still operating, but he was quoted in the article when he said: "There's tens of thousands of them."

The director of the National Transportation Association, Ms. Finkel said: "Unfortunately in many states, these church-type vehicles fall through the cracks of regulations. They don't come under any type of inspection procedures. Their drivers aren't licensed and trained."

Barry Sweedler was also cited as having said that there are still 23 states that have no requirements other than a regular operating license for drivers of buses not used to transport students at school.

Accent on Safety

A History of the National Conferences on School Transportation

1939-1985

Compiled by Ernest Farmer
Director, Pupil Transportation
Tennessee Department of Transportation for the
Eleventh National Conference on School Transportation to Be Held at
Central Missouri State University
Warrensburg, MO
in
May, 1990

In 1966, full-scale testing of school buses was begun at the University of California, Los Angeles, to evaluate their "crash worthiness." A whole series of tests were made which were "carefully planned and fully instrumented," which was designed to gather needed valid, reliable engineering data. The first tests made were at 30 miles per hour. This early research was published in 1967 by the Society of Automotive Engineers and this publication was entitled: *School Bus Passenger Protection*. Since that time a significant number of school bus crash tests have been made by other groups which include consultant groups, a variety of governmental groups, nonprofit traffic safety research groups, and industry. These research studies have been utilized in formulating federal standards for school buses. The expectation for these improved federal standards for school buses would improve the frequency and severity of injuries to pupil passengers and adults on school buses.

In 1967 a 368-page report entitled, *Study of School Bus Safety*, was authored by the principal investigator, Dr. Norman Key, for the National Education Association Safety Commission.

Next, the most significant research was published in 1973 by the U.S. Department of Transportation in a publication entitled: *Pupil Transportation Safety Program Plan*. This work assembled in one publication background statistics and also discussed critical aspects of school bus safety. Also, this publication cited recommendations in regard to seating standards, improving the strength of structural joints, implementing the "121" brake standard, and compiling school bus accident data.

By the year 1974, the Federal Highway Safety Act of 1966 had sponsored improvement in the school bus driver training area, had developed a set of publications that served as upgraded guidelines for pupil transportation, and had funded also individual state projects across the U.S. in school transportation.

In 1977, a comprehensive report to the Congress dealing with school bus accidents entitled: *School Bus Vehicle Safety Report* made its appearance. This report dealt with ways and means for reducing school bus accidents which would also alleviate serious and minor injuries to children and youth. At this time higher grade safety standards for school buses were introduced. From April 1, 1977, we've used the terms pre-April 1, 1977, standard school buses, and post-April 1, 1977, standard school buses. It is estimated that slightly over 20 percent of school buses utilized today are yet pre-April 1, 1977 standard buses. This appears to be a high priority with most individuals and groups concerned with school bus safety to have these buses replaced with the newer buses (constructed after April 1, 1977) which have the higher standards for safety construction.

During this era of advancement in school bus safety standards, the School Bus Manufacturers Institute (SBMI) developed a report entitled: *School Bus Design Objectives*. This report described four types of body designs of school buses, had a section on body mounting, and had a part that dealt with body mounting. Also, some 30 safety standards from the federal government for school buses were described. Other specifics for school bus construction were cited in terms of body and classes minimum standards. The federal standard was numbered 17 and was entitled "Pupil Transportation Safety." These standards in this publication defined school buses as Type I and Type II, along with requiring that school buses be a yellow color which was first advocated in 1939.

In 1985, the Tenth National Conference on School Transportation addressed the issue of seat belts in large school buses (more than 10,000 pounds). This conference recognized "the outstanding safety record of school buses and proven effectiveness of passenger protection afforded by the compartmentalization theory adopted in 1977." This conference recommended also that further research studies should be conducted to see if passive restraint systems can yet be improved even more. This conference also developed recommendations requesting the National Highway Traffic Safety Administration (NHTSA) to establish valid strength requirements for joints and outside panels of the bus body. There were also recommendations made which encouraged all agencies that transport school children to purchase and utilize school buses which meet federal school bus standards, and also urged manufacturers to investigate the methods used to fasten school bus seats to the floor of the body.

Findings

1. Need more valid, reliable experiential research of the "problem," upon which to develop needed public policy dealing with the issue.
2. Need to develop federal and state standards, in concert, for the implementation of a uniform approach in dealing with the issue of seat belts in large school buses.
3. Need to develop voluntary programs through incentive monies and free technical assistance for school districts to be involved in a meaningful way, with the trial installation and use of seat belts.
4. Need some good public policy developed to encourage standards dealing with this issue.
5. Need to involve state agencies, along with federal agencies, to develop compatible standards for seat belt usage on large school buses which are feasible, affordable, and desirable for school bus tranpsortation at the local level.
6. Need to develop an experimental study using seat belts in large school buses over a long enough period of time to assess a significant number of accidents, so that a valid and reliable database can be developed and utilized to develop worthy public policy which leads to enhanced safety for school buses.
7. Need to identify and implement a functioning task force made up of individuals and groups interested and concerned with the issues to develop needed guidelines for total safety in school buses.

Summary

To date after at least 20 years of numerous studies of this "issue", there still appears to be no consensus of thinking by all interested and concerned individuals and groups.

The issue is: "Should seat belts be installed and utilized by passengers in large school buses (more than 10,000 pounds)?" Part of the indecision appears to be the lack of a database of accident experience at the time of the analysis of the research and related literature that has been produced in the past 20 years. Also, to date it appears that only approximately 130 school districts have utilized seat belts in large school buses.

Some other elements of the problem which have not yet led to a convincing evidence of the need, or the lack of the need, are:

1. Lack of enough accident data equipped with and without seat belts.
2. Lack of public policy developed at the federal, state, and local levels.
3. Lack of agreement of the research groups, federal agencies, state agencies, other groups, and individuals interested in the issue.
4. Lack of federal and state standards requiring use, or non-use of seat belts.
5. Lack of a convincing coordinated effort "to come to" a rationale decision.
6. Lack of incentive monies in all states to date except one, New York, to try seat belts, at least on a voluntary basis. Even in New York, after the seat belts are installed, voluntary use is an option which appears to be "self-defeating." Note: This legislation is effective for all new large school buses constructed after 7-1-87 for New York state.
7. Lack of a public awareness by the general public in regard to the issue.
8. Continued misinformation about use and non-use advantages and disadvantages by the general population.
9. Lack of a well planned extensive longitudinal experimental study of seat belts utilized in large school buses to date.
10. Large "gaps" of understanding exist between the research community and groups who often emotionally believe that there should be absolutely no doubt about the need to install and use seat belts in all large school buses.

11. The lack of a candid, succinct definition of the "issue" which all sincerely interested and concerned people can agree upon.

12. The lack of a needed concerted effort to bring the various factions together (like a task force) to resolve this issue [note it appears to have been "boiling" for at least 20 years].

13. The need is for a well thought-out master plan to resolve this issue.

14. There is a lack of leadership at the federal, state, and local levels to resolve this issue.

Conclusions

1. Agreement on the issue is needed.
2. Agreement will probably not come until various factions "listen" to the evidence that is available and makes an effort to gather needed evidence.
3. An extensive experimental study on a longitudinal basis is probably needed before valid, reliable data can be gathered to base a sound decision.
4. The "emotionalism" may need to be eliminated in objectively resolving the issue.
5. The "issue" needs to be defined clearly to the satisfaction of those concerned.
6. Incentive grants for local school districts which wish to install seat belts and utilize them in all newly constructed large school buses may be one of the most viable ideas.
7. The general population could profit from being educated in regard to the issue.
8. A longitudinal study of the accident data, past and future, would be valuable.
9. A national study to be published in the spring of 1989 can yet shed needed light on the issue.
10. Federal and state agencies could jointly develop standards, which are acceptable at the local implementation level.

APPENDIX A

School Bus Accident Data for Wisconsin

Year	Total Accidents	%	Fatalities	Injuries	Property Damage
1977	708	0.3	1	202	515
1978	858	0.3	4	201	653
1979	1,059	0.4	6	251	836
1980	646	0.3	1	214	431
1981	576	0.3	4	180	392
1982	565	0.3	4	161	400
1983	484	0.3	3	159	322
1984	558	0.3	1	172	385
1985	773	0.4	3	237	533
1986	667	0.3	4	211	452
Totals	6,904	0.34	31	1,988	4,919

Note: There have been no killed passengers, within large school buses, reported in the 10-year period described above. The fatalities reported occurred outside of the large school buses, either while passengers were being loaded or unloaded upon school buses. There were a total of 31 fatalities identified in the 10 years of experience, which represented .34% of 1.0% of all motor vehicle fatalities for these 10 years of experience.

Wisconsin Department of Transportation

February 17, 1988

William T. Richards, Ph.D
Transportation Supervisor
Department of Public Instruction
125 South Webster Street
P.O. Box 7841
Madison, WI 53707-7841

Dear Dr. Richards:

We are writing in response to your letter of 2-3-88 asking for information on past studies on safety belts in school buses and opinions on various aspects of this issue.

The Traffic Accident Section can provide statistics on school bus accidents, injury or killed occupants, etc. Our Section, however, has not done specific studies on the safety equipment issue for school buses, nor does the Department of Transportation support or oppose the installation requirements.

You may wish to contact Robert W. Christian, Executive Director of the Wisconsin School Bus Association (414-457-7008) or Rita Johnson of the Department of Transportation, Division of Planning & Budget (266-1443) for more information if you have not already done so.

If we can be of further assistance, please feel free to again contact us.

Sincerely,

Barb Wehrle

Barb Wehrle
Analyst

THE STATE OF WISCONSIN • DEPARTMENT OF PUBLIC INSTRUCTION
125 South Webster Street • Box 7841 • Madison, Wisconsin 53707-7841
Herbert J. Grover, State Superintendent / Tim Quinn, Deputy State Superintendent
(608) 266-3390

February 3, 1988

Lindsay J. Griffin, III
Senior Staff Officer
National Research Board
2101 Constitution Avenue
Washington, DC 20418

Dear Mr. Griffin:

The Wisconsin Legislature has directed the Wisconsin Department of Public Instruction (DPI) to study the feasibility of the use of safety belts in large school buses (10,000 pounds or more). Therefore, I am requesting your help as we begin our search to find what already has been studied, and to profit from the work that has been accomplished to date.

I have identified some basic questions which I wish to explore with you, so will you please respond to the following questions:

1. Should safety belts be installed in large school buses, presently being manufactured?
2. Should large school buses be retrofitted with safety belts now in operation which were manufactured after April 1, 1977?
3. Should safety belts be installed in large school buses manufactured before April 1, 1977?
4. What factors need to be considered in installing safety belts in all large school buses?
5. Why have large school buses to date been exempt from federal standards for the installation of safety belts?
6. Are there other safety features which do provide greater safety for children, rather than safety belts?
7. What are the advantages for the installation and use of safety belts in large school buses?
8. What are the disadvantages in installing and using safety belts in large school buses?
9. What is your position on the installation and use of safety belts in large school buses?
10. How did you decide your position?

On December 1, 1987, the Wisconsin Legislature made effective mandatory use of safety belts in motor vehicles, with certain exemptions (like large school buses). Within this legislation the Wisconsin Department of Public Instruction was directed to report to the Wisconsin Legislature as of July 1, 1988, in regard to the feasibility of the installation and use of safety belts in large school buses.

As you can see, we have a short deadline to accomplish this task and would appreciate receiving this information at your earliest convenience. I would greatly appreciate your help in this matter, and would request any other suggestions in terms of resource references on this issue, and copies of any work you've done to date.

Sincerely,

Wm. T. Richards

Wm. T. Richards, Ph.D
Transportation Supervisor
(608) 267-9215

WTR/bc/★BC 01

42

NATIONAL RESEARCH COUNCIL
TRANSPORTATION RESEARCH BOARD
2101 Constitution Avenue Washington, D.C. 20418

Office Location
2001 Wisconsin Avenue, N.W.
Washington, D.C.

Telephone: (202) 334-2934
Telex: 248664 NASWUR
Telecopier: (202) 334-2854

February 10, 1988

William T. Richards, Ph.D.
Transportation Supervisor
Department of Public Instruction
125 South Webster Stret
Box 7841
Madison, Wisconsin 53707-7841

Dear Bill:

Thank you very much for your letter of February 3, 1988 and for your interest in the work that the Transportation Research Board (TRB) is now conducting on school bus safety. Let me give you a little background.

In the Surface Transportation and Uniform Relocation Assistance Act of 1987 [Section 204(a)] the United States Congress called upon the National Academy of Sciences to examine the causes of school bus accidents and to evaluate the effectiveness of measures, including seat belts, that might better protect children while boarding, riding, or leaving school buses. See Enclosure 1.

In response to this legislation, the Academy's National Research Council, acting through TRB has appointed a study committee including experts in highway safety, vehicle design, school transportation, and trauma. The committee will critically review existing data and available research pertaining to school bus safety, identify potential measures to improve the safety of school bus operations, and assess the benefits and costs of these measures. Based upon its analyses, the committee may recommend specific actions or strategies for improving school bus safety. A brief description of the project the committee has undertaken, and a list of its members, are provided as Enclosures 2 and 3.

The final report of the committee is due to be completed by the end of March 1989. Until the report is released, I am sure you understand that the deliberations of the committee are privileged and any interim hypotheses they may be entertaining, or tentative conclusions they may arrive at, cannot be disclosed. Accordingly, I am not able to provide you with full answers to the questions you have posed. Furthermore, the answers that I am providing are based upon my knowledge and do not necessarily reflect the views of the committee.

1. *Should safety belts be installed in large school buses, presently being manufactured?*

   To this question I can only tell you that the American Medical Association, Physicians for Automotive Safety, National Coalition

for Seatbelts on School Buses, American Academy of Pediatrics, Society for Adolescent Medicine, American College of Emergency Physicians, and the National Parent Teacher Association would say "yes." The National Highway Traffic Safety Administration, National Transportation Safety Board, Transport Canada, and National Safety Council would say "no."

2. *Should large school buses be retrofitted with safety belts now in operation which were manufactured after April 1, 1977?*

   The answer to question 1 applies here as well.

3. *Should safety belts be installed in large school buses manufactured before April 1, 1977?*

   I know of no organization that recommends retrofitting pre-standard (pre-April 1977) school buses (with gross vehicle weight ratings in excess of 10,000 pounds) with seat belts.

4. *What factors need to be considered in installing safety belts in all large school buses?*

   I am not sure I understand this questions. I need clarification.

5. *Why have large school buses to date been exempt from federal standards for the installation of safety belts?*

   The National Highway Traffic Safety Administration believes that its current standard (See Title 49, Part 571.222 of the Code of Federal Regulations) provides adequate protection for school bus passengers. This standard is intended to provide passive protection to passengers by "compartmentalizing" them in seats placed closer together -- and by padding the seat backs, and making them higher.

6. *Are there other safety features which do provide greater safety for children, rather than safety belts?*

   This issue is being considered by the committee, as requested in the legislation.

7. *What are the advantages for the installation and use of safety belts in large school buses?*

8. *What are the disadvantages in installing and using safety belts in large school buses?*

   Let me answer questions 7 and 8 together by quoting from some material that I recently prepared for publication. This material is privileged and should not be quoted. It is provided solely to explicate the arguments for and against seat belts.

Pros and Cons of Seat Belt Installation:

Advocates of seat belts on Type I buses advance the following arguments in support of seat belt installation:

(a) Given a crash, the use of seat belts will reduce the probability of death (and the severity of injuries) to children correctly seated in post-1977 buses. Furthermore, the use of seat belts will keep children in their seats and, thereby, further reduce deaths and injuries for "out of position" passengers, e.g. children who may have put a head or arm out the window; children who are out of their seats when a collision occurs.

(b) Seat belt usage will improve passenger behavior and reduce driver distractions. Reductions in driver distractions may translate into accidents avoided.

(c) Use of seat belts on school buses will have a "carry over" effect that encourages children to use seat belts when riding in other vehicles.

(d) The cost of installing lap belts on Type I buses is minimal, no more than one to two thousand dollars per bus.

Opponents of seat belts on Type I buses enumerate several objections to belts:

(a) The installation of seat belts in school buses does not guarantee seat belt usage. If seat belts are not used, they cannot reduce deaths and injuries, given a collision.

School bus collisions that result in deaths or serious injuries to bus passengers are often catastrophic accidents involving tractor trailer trucks, trains, massive fixed objects, etc. In these accidents seat belts are of little or no benefit and, in some cases, may be harmful. In less catastrophic accidents, current (post 1977) standards provide adequate school bus passenger protection.

Although some would argue that the use of seat belts will keep a child in his seat, with head and arms inside the bus, no school district "permits," and no school bus driver should allow, passengers to move about the bus, or extend a head or arm through a window. If current policies requiring students to stay in their seats (with head and arms inside the bus) are disregarded, why would a policy requiring the use of seat belts be obeyed?

(b) Seat belt usage on school buses may reduce driver distractions, but, if drivers are required to insure that all students are correctly buckled in place, driver distractions may increase.

(c) If drivers do not insist that students use their belts, then any potential "carry over" effect of using belts on buses will be lost. Indeed, if children ride unbelted in belt equipped buses, the message they learn, and the behavior they "carry over" to a passenger car, may be harmful.

(d) Finally, deaths and injuries to school bus passengers are rare events. To invest one to two thousand dollars per bus in seat belts in the hope of forestalling the few casualties that do occur is to preclude making other investments (e.g., earlier retirement of older, pre-1977 school buses) that might yield higher returns in reduced deaths and injuries.

9. *What is your position on the installation and use of safety belts in large school buses?*

10. *How did you decide your position?*

The position of the committee on the use of seat belts on large school buses will not be made known to the public until March 1989. With the publication of its final report, the committee will state its position on this issue -- and how it arrived at its position.

Bill, I am sorry that I cannot be of more assistance to you in responding to the Wisconsin Legislature, but I hope that my responses, brief as they are, are of some benefit. In addition, I am enclosing a list of all the documents on school bus safety that I have collected thus far on behalf of the committee. This list may contain a few items not included in your computerized search.

If I can be of further assistance to you -- without going into the specifics of the committee's deliberations -- please let me know. Best of luck on your project.

Sincerely,

Lindsay I. Griffin, III
Senior Program Officer

cc: C.V. Wootan

FEB 05 1988

APPENDIX D

THE STATE OF WISCONSIN • DEPARTMENT OF PUBLIC INSTRUCTION

125 South Webster Street • Box 7841 • Madison, Wisconsin 53707-7841

Herbert J. Grover, State Superintendent / Tim Quinn, Deputy State Superintendent

(608) 266-3390

February 3, 1988

Maynard Stoehr
Highway Safety Coordinator
Highway Safety Office
Room 936, P.O. Box 7910
Madison, WI 53707

Dear Mr. Stoehr:

The Wisconsin Legislature has directed the Wisconsin Department of Public Instruction (DPI) to study the feasibility of the use of safety belts in large school buses (10,000 pounds or more). Therefore, I am requesting your help as we begin our search to find what already has been studied, and to profit from the work that has been accomplished to date.

I have identified some basic questions which I wish to explore with you, so will you please respond to the following questions:

1. Should safety belts be installed in large school buses, presently being manufactured?
2. Should large school buses be retrofitted with safety belts now in operation which were manufactured after April 1, 1977?
3. Should safety belts be installed in large school buses manufactured before April 1, 1977?
4. What factors need to be considered in installing safety belts in all large school buses?
5. Why have large school buses to date been exempt from federal standards for the installation of safety belts?
6. Are there other safety features which do provide greater safety for children, rather than safety belts?
7. What are the advantages for the installation and use of safety belts in large school buses?
8. What are the disadvantages in installing and using safety belts in large school buses?
9. What is your position on the installation and use of safety belts in large school buses?
10. How did you decide your position?

On December 1, 1987, the Wisconsin Legislature made effective mandatory use of safety belts in motor vehicles, with certain exemptions (like large school buses). Within this legislation the Wisconsin Department of Public Instruction was directed to report to the Wisconsin Legislature as of July 1, 1988, in regard to the feasibility of the installation and use of safety belts in large school buses.

As you can see, we have a short deadline to accomplish this task and would appreciate receiving this information at your earliest convenience. I would greatly appreciate your help in this matter, and would request any other suggestions in terms of resource references on this issue, and copies of any work you've done to date.

Sincerely,

Wm. T. Richards, Ph.D
Transportation Supervisor
(608) 267-9215

WTR/bc/★BC 01

47

Wisconsin Department of Transportation

OFFICE FOR HIGHWAY SAFETY
P.O. Box 7910, Rm 933
Madison, WI 53707-7910
(608) 266-0402

March 8, 1988

Dr. William T. Richards
Transportation Supervisor
Dept. of Public Instruction
125 S Webster St.
P.O. Box 7841
Madison, WI 53707-7841

Dear Dr. Richards:

In response to your letter of February 3, 1988, I am enclosing a copy of materials we have regarding safety belts in school buses.

In response to the series of questions you have posed, there are some that would be answered with individual and independent opinion, and others based on information available.

1. This question would preferably be answered by manufacturers, i.e., how much would vehicle design have to be changed? How are the vehicles presently designed? (There is no federal standard, that I am aware of, that would detail safety belt installation in a school bus.)

2. I suggest you discuss cost, etc., with the owners/operators and manufacturers.

3. We need a federal standard in order to assure uniformity for installation, if it is deemed they should be installed.

4. Refer to answer #3.

5. I can't answer this question. You will have to contact the federal government.

6. The school buses have been compartmentalized, i.e, seat backs have been raised, book racks taken out, etc., to provide more safety for children.

7. & 8. Perhaps there is data available in a school district that would address your questions. We do not have data available in our office.

9. I have no firm position.

10. I have not decided at this time.

Sincerely,

Maynard G. Stoehr, Director
Office for Highway Safety

MGS:dab/1081

48

THE STATE OF WISCONSIN • DEPARTMENT OF PUBLIC INSTRUCTION

125 South Webster Street • Box 7841 • Madison, Wisconsin 53707-7841

Herbert J. Grover, State Superintendent / Tim Quinn, Deputy State Superintendent

(608) 266-3390

February 3, 1988

Dr. Frank Kenel
Traffic Safety Consultant
American Automobile Association
Traffic Safety Department
8111 Gatehouse Road
Falls Church, VA 22047

Dear Dr. Kenel:

The Wisconsin Legislature has directed the Wisconsin Department of Public Instruction (DPI) to study the feasibility of the use of safety belts in large school buses (10,000 pounds or more). Therefore, I am requesting your help as we begin our search to find what already has been studied, and to profit from the work that has been accomplished to date.

I have identified some basic questions which I wish to explore with you, so will you please respond to the following questions:

1. Should safety belts be installed in large school buses, presently being manufactured?
2. Should large school buses be retrofitted with safety belts now in operation which were manufactured after April 1, 1977?
3. Should safety belts be installed in large school buses manufactured before April 1, 1977?
4. What factors need to be considered in installing safety belts in all large school buses?
5. Why have large school buses to date been exempt from federal standards for the installation of safety belts?
6. Are there other safety features which do provide greater safety for children, rather than safety belts?
7. What are the advantages for the installation and use of safety belts in large school buses?
8. What are the disadvantages in installing and using safety belts in large school buses?
9. What is your position on the installation and use of safety belts in large school buses?
10. How did you decide your position?

On December 1, 1987, the Wisconsin Legislature made effective mandatory use of safety belts in motor vehicles, with certain exemptions (like large school buses). Within this legislation the Wisconsin Department of Public Instruction was directed to report to the Wisconsin Legislature as of July 1, 1988, in regard to the feasibility of the installation and use of safety belts in large school buses.

As you can see, we have a short deadline to accomplish this task and would appreciate receiving this information at your earliest convenience. I would greatly appreciate your help in this matter, and would request any other suggestions in terms of resource references on this issue, and copies of any work you've done to date.

Sincerely,

Wm. T. Richards

Wm. T. Richards, Ph.D
Transportation Supervisor
(608) 267-9215

WTR/bc/★BC 01

49

American Automobile Association

April 12, 1988

Dr. William T. Richards
Transportation Supervisor
State of Wisconsin
Department of Public Instruction
125 South Webster Street
Box 7841
Madison, Wisconsin 53707-7841

Dear Bill:

The question of safety belts on large school buses is obviously generating a great deal of heat. Just as obvious is the fact that there is very little light being shed on the subject.

As I mentioned to you in our telephone conversation, Fairfax County, Virginia, and Montgomery County, Maryland, were requiring that new purchases be outfitted with belts. Their experience, however, was disillusioning and, as a result, belts are no longer being installed. Bear in mind that safety belt use, at least in Fairfax, was voluntary at the secondary level. (Problems: 1. Drivers could not monitor use of belts unless the driver left his or her seat and walked to the back of the bus. At the elementary level the problem was basically the same, except that even when children put their belts on, someone had to make sure they were properly adjusted.)

Response to your 10 questions: 1. Should safety belts be installed in large school buses presently being manufactured? It is our opinion that there is insufficient research available to indicate that installation of belts would offer protection beyond that which is now provided through packaging.

2. Should large school buses now in operation be retrofitted with belts? In addition to the problems identified in item #1., the cost is not insignificant. For large districts, the cost would require major dollar transfusions. And on the basis of accident statistics, there appears to be little justification for such expenditures.

Answer to question 3. would be the same as item #2.

4. What factors need to be considered in installing safety belts in all large school buses? How to monitor usage, structural changes, if in fact, you use a self-adjusting belt and mandate usage are you going to allocate a second person to ride on all buses to insure usage. If not, then the issue of habit formation goes out the window because the one that you are reinforcing is the one that you are trying to extinguish.

5. Why have large school buses to date been exempt from Federal standards for the installation of safety belts? Research, re practicality and real-world experience. An overwhelming percentage of school bus-related fatalities occur outside of the bus. If post-1977 packaging procedures are employed, the level of protection provided appears to be equal to or superior to that provided through the use of lap belts alone.

6. Are there other safety features which do provide greater safety for children rather than safety belts? The safety standards package would appear, particularly in light of the National Transportation Safety Board's findings relative to lap belts only for children that the hazards may well outweigh any advantages that the belts may provide even in those cases where bus passengers become fatalities.

7. What are the advantages? The purported advantages are: habit development and potential reduction in case of turnover or side-impact crashes.

8. The disadvantages are: potential increase in injuries in frontal and side crashes due to head injuries; abusive use of belts and injuries due to improper fastening and adjustment.

9. Our position is that there is insufficient evidence to indicate a mandate for use of safety belts on large school buses at this point particularly in light of the packaging requirements post-1977.

10. Our position was decided on the basis of the research conducted and available through D.O.T. and Transport Canada.

I hope this information will be of assistance to you.

Sincerely,

Dr. Francis C. Kenel
Staff Director
Traffic Safety Department
(703) 222-6621

THE STATE OF WISCONSIN • DEPARTMENT OF PUBLIC INSTRUCTION

125 South Webster Street • Box 7841 • Madison, Wisconsin 53707-7841

Herbert J. Grover, State Superintendent / Tim Quinn, Deputy State Superintendent

(608) 266-3390

February 3, 1988

School Bus Transportation Consultant
School Bus Transportation Division
National Safety Council
444 N. Michigan Avenue
Chicago, IL 60611

Dear Consultant:

The Wisconsin Legislature has directed the Wisconsin Department of Public Instruction (DPI) to study the feasibility of the use of safety belts in large school buses (10,000 pounds or more). Therefore, I am requesting your help as we begin our search to find what already has been studied, and to profit from the work that has been accomplished to date.

I have identified some basic questions which I wish to explore with you, so will you please respond to the following questions:

1. Should safety belts be installed in large school buses, presently being manufactured?
2. Should large school buses be retrofitted with safety belts now in operation which were manufactured after April 1, 1977?
3. Should safety belts be installed in large school buses manufactured before April 1, 1977?
4. What factors need to be considered in installing safety belts in all large school buses?
5. Why have large school buses to date been exempt from federal standards for the installation of safety belts?
6. Are there other safety features which do provide greater safety for children, rather than safety belts?
7. What are the advantages for the installation and use of safety belts in large school buses?
8. What are the disadvantages in installing and using safety belts in large school buses?
9. What is your position on the installation and use of safety belts in large school buses?
10. How did you decide your position?

On December 1, 1987, the Wisconsin Legislature made effective mandatory use of safety belts in motor vehicles, with certain exemptions (like large school buses). Within this legislation the Wisconsin Department of Public Instruction was directed to report to the Wisconsin Legislature as of July 1, 1988, in regard to the feasibility of the installation and use of safety belts in large school buses.

As you can see, we have a short deadline to accomplish this task and would appreciate receiving this information at your earliest convenience. I would greatly appreciate your help in this matter, and would request any other suggestions in terms of resource references on this issue, and copies of any work you've done to date.

Sincerely,

Wm T Richards

Wm. T. Richards, Ph.D
Transportation Supervisor
(608) 267-9215

WTR/bc/★BC 01

52

National Safety Council

February 9, 1988

William T. Richards, Ph.D.
Transportation Supervisor
The State of Wisconsin
Dept. of Public Instruction
125 S. Webster Street
Madison, WI 53707-7841

Dear Dr. Richards:

Your letter of February 3, 1988, regarding safety belts on school buses was referred to me for reply.

In this connection, I am enclosing the National Safety Council's Policy on Protecting Pupil Passengers in School Buses. Also enclosed is an excerpt from our Fleet Safety Newsletter discussing a study conducted by the National Transportation Safety Board. The study, Report No. NTSB/SS-87/01, Government Accession No. PB87-917002, is available to the public through the National Technical Information Service, Springfield, VA 22161.

We trust this information will be of assistance. You may wish to contact the National School Transportation Association, P.O. Box 2639, Springfield, VA 22152, for additional information.

Sincerely,

Janet D. Holmes
Coordinator
School Transportation Programs
Motor Transportation Department

JDH:hs
Encl.

444 North Michigan Avenue
Chicago, Illinois 60611
312-527-4800

A Nongovernmental
Not-for-Profit
Public Service Organization

National Safety Council

NATIONAL SAFETY COUNCIL POLICY
on
PROTECTING PUPIL PASSENGERS IN SCHOOL BUSES

The National Safety Council supports methods and procedures that effectively provide safe transportation of pupils aboard school buses. The Council believes that until further research and testing demonstrate that pupils will be safer by the installation of seat belts in school buses, passive protection provided by compartmentalization, as required by the current (1977) federal standard on school bus seating and crash protection, protects seated pupil passengers in school buses with gross vehicle weight ratings (GVWR) greater than 10,000 pounds. (Compartmentalization involves protecting each passenger by the seat, the seat back, and the back of the seat or restraining barrier immediately in front of it.) The Council also recommends additional research regarding pupil passenger safety in and around school buses, especially as related to seat belts.

Approved by the Board Governmental Relations Committee, April 17, 1986
Approved by the Board of Directors, April 17, 1986

Supersedes policy approved by the
Motor Transportation Division, May 2, 1984
Executive Committee, Board of Directors, June 28, 1984
Board of Directors, October 16, 1984

National Safety Council

Fleet Safety Newsletter

JULY–AUGUST 1987

Lap Belts Fail To Reduce School Bus Passenger Injuries

Federal standards for large school bus construction, established in 1977, significantly have improved the safety of this form of transportation, reported the National Transportation Safety Board in a study of 43 school bus accidents.

The Board said its study of accidents occurring between August 1983 and March 1986, was designed to determine how well large school buses, conforming to the 1977 standards, protected passengers during a crash. Also, the study was intended to show whether lap belt use has the potential to reduce school bus passenger injuries.

During the 29 months the study was conducted, the Board investigated every accident involving a large post-standard school bus that resulted in a school bus passenger fatality (six of the 43 crashes); most, if not all, of the crashes that resulted in serious injuries; and many of the crashes that produced moderate injuries. Some minor accidents also were investigated.

The Board's study showed that school bus passengers generally were well-protected. Only 3.6 percent of the unrestrained school bus passengers in the study sustained more than moderate injuries, and 90 percent sustained no injuries or only minor ones. Of the school bus passengers who died in the fatal accidents, most were involved in head-on collisions.

The Board concluded, "School bus occupant deaths and the serious injuries sustained by survivors . . . were for the most part attributable to the occupants' seating position being in direct line with the crash forces. It is unlikely that the availability of any type of restraint would have improved the injury outcome."

Standard requirements

Federal school bus construction standards require that large school buses manufactured after April 1, 1977, have increased sheet metal panel seam strength; have shatterproof window glass and protection for gas tanks; have a minimum number of emergency exits; and have extensive improvements in seating design, including higherbacked, better padded seats, placed closer together. The Board said post-standard buses of all sizes today are estimated to constitute 60 to 70 percent of public school buses nationwide.

Although the Board said federal standards worked well to protect school bus passengers from injury, it also said that inadequate structural joint strength for maintenance access, floor panels and poorly secured bottom seat cushions, added to the risk of injury in school bus crashes.

In the Board's view, lap belt use by school bus passengers probably would not have changed the number of deaths or severe injuries.

The Board reaffirmed its earlier position that there is insufficient justification to amend federal standards to require the installation of lap belts on large post-standard school buses. The Board also does not recommend that states or school districts allocate funds to purchase or retrofit large school buses with passenger lap belts.

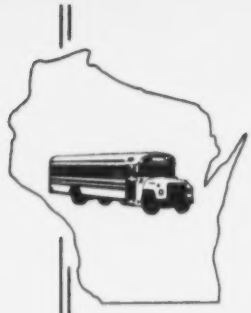
Protecting the driver

Federal standards recommend that school bus drivers wear their available seat belts whenever the vehicle is in motion. This recommendation is based on more than the need for occupant protection for the driver (who is faced with a more hostile environment than passengers): A driver also must remain in his or her seat and in control of the vehicle. Almost half of the school bus drivers in the study were not wearing their lap belts at the moment of impact. In addition, many drivers who reported that they were restrained were not wearing their belts properly. In a few cases, this clearly increased the severity of the accident because the drivers lost control of their vehicles.

The Board recommended that school buses be retrofitted with improved seatbelts for drivers, that school bus drivers on buses without such new belts be instructed on how to adjust the existing belts properly, that drivers be required to wear seat belts when operating the bus, and that this requirement be enforced.

Small school buses and school vans do not have to meet the same standards as large school buses. The Board is studying the crash performance of these smaller vehicles separately and will issue a separate report later. ■

444 North Michigan Avenue
Chicago, Illinois 60611
312-527-4800



JELCO WISCONSIN, INC.

CENTRAL OFFICE: P.O. BOX 298 • WAUKESHA, WISCONSIN 53187 • TELEPHONE: 414/549-3676

March 3, 1988

Mr. W. T. Richards, Ph.D.
Transportation Supervisor
Department of Public Instruction
125 S. Webster Street, P. O. Box 7841
Madison, WI 53707

Dear Mr. Richards:

I am responding to your survey on seat belts on behalf of Lloyd Gutzman of the Green Bay School District.

1. Safety belts should not be installed on buses presently being manufactured unless there is definite proof that it would enhance safety and was cost effective.

2. Same as above.

3. Safety belts should not be retrofitted on buses manufactured prior to April 1, 1977. These buses should now be out of service.

4. Factors to be considered for installation of safety belts -
   a. Enhancement of safety over what is now available.
   b. Cost effectiveness

5. Safety belts are exempt from Federal Standard because (my opinion)
   a. No proof of safety enhancement
   b. Not cost effective

CONTRACT LOCATIONS

BELOIT, WISCONSIN
DEFOREST, WISCONSIN
GREEN BAY, WISCONSIN
HUDSON, WISCONSIN
KENOSHA, WISCONSIN
LA CROSSE, WISCONSIN
LAKE HOLCOMBE, WISCONSIN
MARSHFIELD, WISCONSIN
MENOMONIE, WISCONSIN
NEW RICHMOND, WISCONSIN
PEWAUKEE, WISCONSIN
POYNETTE, WISCONSIN
RACINE, WISCONSIN
RICHLAND CENTER, WISCONSIN
SCHOFIELD, WISCONSIN
SPARTA, WISCONSIN
VALDERS, WISCONSIN
WAUSAU, WISCONSIN

SAFE AND ON TIME STUDENT TRANSPORTATION

6. Current configuration of seating compartments currently provide as great an amount of safety as seat belts.

7. I do not know of any advantage of seat belts.

8. Greatist disadvantage of seat belts -

   a. Cost - seat belts would reduce seating capacities by about 1/3. This would require districts to increase the number of buses by 1/3 an estimated increase in costs of 25 to 30%. There would also be additional cost of installing devices to insure the proper usage of the belts or have aides on buses.

   b. Belts are dangerous if not properly utilized.

9. My position is much more research must be done and more attention given cost effectiveness before any decision be made on mandating seat belts in school buses.

10. All of the above.

Please feel free to contact me if you have any further questions.

Sincerely,

Len LaMere
President

LL/dsf

cc: Mr. Lloyd Gutzman
Green Bay School District

APPENDIX H

Appleton Area School District

120 E. Harris Street • P.O. Box 2019 • Appleton, WI 54913-2019 • 414-735-6161

April 13, 1988

Wm. T. Richards, PhD.
Transportation Supervisor
125 S. Webster Street
Box 7841
Madison, WI 53707-7841

Dear Dr. Richards:

I apologize for the delay in responding to the questions regarding the use of safety belts in large school buses. Somehow the letter got misplaced and I completely forgot. Hope this will be of some value to you.

Response to questions:

1) No. It has not been proven that safety belts will have a significant impact upon safety in large buses.
2) No. Same reason as #1.
3) No. Same reason as #1.
4) Factors to consider when installing safety belts are:
   a) will they be mandatory for all riders?
   b) who will enforce them to be worn?
   c) where does liability lie if seat belts are not worn?
   d) belts will probably reduce the carrying capacity of buses by one third.
   e) cost of installation.
5) Buses use what is described as comparmentalization for students. Many safety features are already in the vehicle, for example, high back seats, padded seats, limited space, and many other safety features of the vehicle body itself. The majority of deaths occur outside the vehicle itself, not within.
6) Yes, mentioned in #5 above.
7) One possible advantage may be that students would be confined to a seat and not be able to move from seat to seat while the vehicle is in motion.
8) The use of safety belts may create more severe injuries in certain types of crashes than if students did not wear belts. Students who are belted with a lap belt may incur severe head injuries upon impact by having the upper portion of their body thrown forward thus striking their head on the seat immediately in front of them. Other disadvantages are the reduction of one third carrying capacity and the cost of installation.

9) Our contractor, John Rohm, and I are not in favor of the requirement to install belts in large school buses.
10) Based upon the fact that school buses are already proven to be the safest form of land transportation available. The safety record is phenominal. The cost involved does not justify the possible increase in safety. Monies would be better spent in training personnel to be more cognizant of their role in transporting students.

The answers to the questions above are the shared responses from both myself and our school bus contractor, John Rohm.

Sincerely,

James E. Doden

James E. Doden
Transportation Coordinator

JED/lj

THE STATE OF WISCONSIN • DEPARTMENT OF PUBLIC INSTRUCTION

125 South Webster Street • Box 7841 • Madison, Wisconsin 53707-7841

Herbert J. Grover, State Superintendent / Tim Quinn, Deputy State Superintendent

(608) 266-3390

January 1988

Dear District Administrator and Transportation Director:

Recent legislation, Senate Bill 7, mandates use of safety belts as of December 1, 1987. A number of motor vehicles are exempt from safety belt usage, such as authorized emergency vehicles operated by enforcement officers, taxicabs, rural letter carriers, land surveying crews, and large school buses having a gross weight of more than 10,000 pounds. All school bus drivers still must wear safety belts, and all other vehicles under 10,000 pounds equipped with safety belts must utilize them for students.

Within Senate Bill 7, the legislature has mandated that the Department of Public Instruction (DPI) do "an analysis of the use of safety belts on large school buses under a voluntary pilot program providing for installation of safety belts on those school buses."

Therefore, in an attempt to meet this legislative mandate, I am requesting representatives of any school districts which are willing to voluntarily install safety belts in their large school buses to contact my office. I wish to emphasize this is strictly a voluntary program. The legislation has provided no financial incentives or technical assistance to help the local school districts or DPI to conduct this study.

If you wish to participate in such a study, please contact me as soon as possible. The legislation mandates this study be conducted during this second semester of this school year, 1987-88.

If you desire or need more information on this legislation, please feel free to contact me.

Sincerely,

Wm. T. Richards

Wm. T. Richards, Ph.D.
Transportation Supervisor
(608)267-9215

ja

60

STATE OF WISCONSIN

Date of enactment:
1987 Senate Bill 7 Date of publication*:

1987 Wisconsin Act

AN ACT *to amend* 343.32 (2) (bt), 347.48 (1), 347.48 (3) and 347.50 (1); and *to create* 343.32 (2) (bu), 345.225, 347.48 (2m), 347.48 (3m), 347.50 (1m) and 347.50 (2m) of the statutes, *relating to* requiring motor vehicle operators and passengers to wear safety belts, granting rule-making authority, providing for studies and providing a penalty.

The people of the state of Wisconsin, represented in senate and assembly, do enact as follows:

SECTION 1. **Legislative intent.** It is the intent of the legislature to promote the safety of the traveling public and reduce the number of deaths and injuries resulting from traffic accidents by requiring the use of safety belts. This requirement is not intended to be a disincentive to requiring the installation of automatic occupant restraints under federal regulations. This requirement, therefore, is not intended to be counted by the U.S. secretary of transportation as a mandatory safety belt use law under 49 CFR 571.208 S4.1.5 whose adoption would affect the applicability of federal automatic occupant restraint requirements.

SECTION 1m. 343.32 (2) (bt) of the statutes is amended to read:

343.32 (2) (bt) The scale adopted by the secretary may not assess any demerit points for a violation of s. 347.48 (2m) (b), (c) or (d) or (4) (a). This paragraph does not apply after June 30, 1989; or the first day of the first month commencing after the secretary of transportation certifies to the governor and the revisor of statutes that state mandatory safety belt usage laws meeting the criteria under 49 CFR 571.208 S4.1.5 have been enacted which would, with the inclusion of 1987 Wisconsin Act .... (this act), be applicable to not less than two-thirds of the population of the United States, based on the 1980 federal census of population; whichever is earlier.

SECTION 2. 343.32 (2) (bu) of the statutes is created to read:

343.32 (2) (bu) The scale adopted by the secretary may not assess any demerit points for a violation of s. 347.48 (4) (a). This paragraph applies after June 30, 1989; or the first day of the first month commencing after the secretary of transportation certifies to the governor and the revisor of statutes that state mandatory safety belt usage laws meeting the criteria under 49 CFR 571.208 S4.1.5 have been enacted which would, with the inclusion of 1987 Wisconsin Act .... (this act), be applicable to not less than two-thirds of the population of the United States, based on the 1980 federal census of population; whichever is earlier.

SECTION 2m. 345.225 of the statutes is created to read:

345.225 Authority to arrest for safety belt violations limited. Notwithstanding s. 345.22, a person may not be arrested solely for violating a traffic regulation under s. 347.48 (1), (2) or (2m). This section does not apply after June 30, 1989.

SECTION 3. 347.48 (1) of the statutes is amended to read:

347.48 (1) SAFETY BELTS REQUIRED. It is unlawful for any person to buy, sell, lease, trade or transfer a motor vehicle at retail from or to Wisconsin residents ~~at retail an automobile, which is manufactured or assembled commencing with the 1962 models,~~ unless such vehicle is equipped with safety belts installed for use ~~in the left front and right front seats thereof~~ as required under 49 CFR 571, and no such vehicle shall be operated in this state unless such belts remain installed.

SECTION 4. 347.48 (2m) of the statutes is created to read:

347.48 (2m) REQUIRED USE. (a) In this subsection, "properly restrained" means wearing a safety belt approved by the department under sub. (2) and fastened in a manner prescribed by the manufacturer of the safety belt which permits the safety belt to act as a body restraint.

* Section 991.11, WISCONSIN STATUTES 1985-86: Effective date of acts. "Every act and every portion of an act enacted by the legislature over the governor's partial veto which does not expressly prescribe the time when it takes effect shall take effect on the day after its date of publication as designated" by the secretary of state [the date of publication may not be more than 10 working days after the date of enactment].

(b) If a motor vehicle is required to be equipped with safety belts in this state, no person may operate that motor vehicle unless the person is properly restrained in a safety belt.

(c) If a motor vehicle is required to be equipped with safety belts in this state, no person may operate that motor vehicle unless he or she reasonably believes that each passenger who is at least 4 years old and not more than 15 years old and who is seated at a designated seating position required under 49 CFR 571 to have a safety belt installed is properly restrained.

(d) If a motor vehicle is required to be equipped with safety belts in this state, no person who is at least 4 years old and who is seated at a designated seating position required under 49 CFR 571 to have a safety belt installed may be a passenger in that motor vehicle unless the person is properly restrained.

(dm) Paragraphs (b) and (c) do not apply to the operation of an authorized emergency vehicle by a law enforcement officer under circumstances in which compliance could endanger the safety of the operator or another.

(dr) Paragraph (b) does not apply to the operator of a vehicle while on a route which requires the operator to make more than 10 stops per mile involving an exit from the vehicle in the scope of his or her employment. Paragraph (d) does not apply to a passenger while on a route which requires the passenger to make more than 10 stops per mile involving an exit from the vehicle in the scope of his or her employment.

(e) The department shall, by rule, exempt from the requirements under pars. (b) to (d) persons who, because of a physical or medical condition, cannot be properly restrained in a safety belt.

(f) 1. This subsection does not apply if the motor vehicle is a taxicab or is not required to be equipped with safety belts under sub. (1) or 49 CFR 571.

2. This subsection does not apply to a privately owned motor vehicle while being operated by a rural letter carrier for the delivery of mail or while being operated by a delivery person for the delivery of newspapers or periodicals.

3. This subsection does not apply to a motor vehicle while being operated by a land surveying crew while conducting a land survey along or upon the highway.

7. This subsection does not apply to a farm truck or dual purpose farm truck while being used in conjunction with the planting or harvesting of crops and not being operated upon the highway.

(g) Evidence of compliance or failure to comply with par. (b), (c) or (d) is admissible in any civil action for personal injuries or property damage resulting from the use or operation of a motor vehicle. Notwithstanding s. 895.045, with respect to injuries or damages determined to have been caused by a failure to comply with par. (b), (c) or (d), such a failure shall not reduce the recovery for those injuries or damages by more than 15%. This paragraph does not affect the determination of causal negligence in the action.

(gm) Notwithstanding s. 349.02, a law enforcement officer may not stop or inspect a vehicle solely to determine compliance with this subsection or sub. (1) or (2). This paragraph does not limit the authority of a law enforcement officer to issue a citation for a violation of this subsection or sub. (1) or (2) observed in the course of a stop or inspection made for other purposes.

(h) This subsection does not apply after June 30, 1989; or the first day of the first month commencing after the secretary of transportation certifies to the governor and the revisor of statutes that state mandatory safety belt usage laws meeting the criteria under 49 CFR 571.208 S4.1.5 have been enacted which would, with the inclusion of 1987 Wisconsin Act .... (this act), be applicable to not less than two-thirds of the population of the United States, based on the 1980 federal census of population; whichever is earlier.

SECTION 5. 347.48 (3) of the statutes is amended to read:

347.48 (3) MANDATORY USE BY RULE; PROHIBITED. Except as provided under sub. (4) (a) 2, the department may not, by rule, require directly or indirectly the wearing of safety belts or shoulder harnesses. This subsection applies after June 30, 1989; or the first day of the first month commencing after the secretary of transportation certifies to the governor and the revisor of statutes that state mandatory safety belt usage laws meeting the criteria under 49 CFR 571.208 S4.1.5 have been enacted which would, with the inclusion of 1987 Wisconsin Act .... (this act), be applicable to not less than two-thirds of the population of the United States, based on the 1980 federal census of population; whichever is earlier.

SECTION 6. 347.48 (3m) of the statutes is created to read:

347.48 (3m) SAFETY BELT INFORMATION PROGRAM. The department shall develop and administer a public information program to promote safety belt awareness and use.

SECTION 7. 347.50 (1) of the statutes is amended to read:

347.50 (1) Any person violating ss. 347.35 to 347.49, except s. 347.415 (1), (2) and (3) to (5) or s. 347.48 (2m) or (4) (a) or s. 347.489, may be required to forfeit not less than $10 nor more than $200. This subsection does not apply after June 30, 1989; or the first day of the first month commencing after the secretary of transportation certifies to the governor and the revisor of statutes that state mandatory safety belt usage laws meeting the criteria under 49 CFR 571.208 S4.1.5 have been enacted which would, with the inclusion of 1987 Wisconsin Act .... (this act), be applicable to not less than two-thirds of the population of the United States, based on the 1980 federal census of population; whichever is earlier.

SECTION 8. 347.50 (1m) of the statutes is created to read:

347.50 (1m) Any person violating ss. 347.35 to 347.49, except s. 347.415 (1), (2) and (3) to (5) or s. 347.48 (4) (a) or s. 347.489, may be required to forfeit not less than $10 nor more than $200. This subsection applies after June 30, 1989; or the first day of the first month commencing after the secretary of transportation certifies to the governor and the revisor of statutes that state mandatory safety belt usage laws meeting the criteria under 49 CFR 571.208 S4.1.5 have been enacted which would, with the inclusion of 1987 Wisconsin Act .... (this act), be applicable to not less than two-thirds of the population of the United States, based on the 1980 federal census of population; whichever is earlier.

SECTION 9. 347.50 (2m) of the statutes is created to read:

347.50 (2m) (a) Any person who violates s. 347.48 (2m) (b) or (c) and any person 16 years of age or older who violates s. 347.48 (2m) (d) may be required to forfeit $10.

(b) No forfeiture may be assessed for a violation of s. 347.48 (2m) (d) if the violator is less than 16 years of age when the offense occurs.

(c) This subsection does not apply after June 30, 1989; or the first day of the first month commencing after the secretary of transportation certifies to the governor and the revisor of statutes that state mandatory safety belt usage laws meeting the criteria under 49 CFR 571.208 S4.1.5 have been enacted which would, with the inclusion of 1987 Wisconsin Act .... (this act), be applicable to not less than two-thirds of the population of the United States, based on the 1980 federal census of population; whichever is earlier.

SECTION 9r. **Nonstatutory provisions; studies by the office of the commissioner of insurance.** (1) The office of the commissioner of insurance shall study and make recommendations regarding the feasibility of requiring insurers to offer motor vehicle insurance policies that require all passengers in the insured motor vehicle to wear safety belts as a condition of coverage under the policy, and the feasibility of requiring insurers to offer a discount in the premiums charged under motor vehicle insurance policies for safety belt users. The officer of the commissioner of insurance shall submit the study and recommendations to the chief clerk of each house of the legislature by January 1, 1989, for distribution to the appropriate standing committees.

(2) The office of the commissioner of insurance shall study the impact of required safety belt usage under section 347.48 (2m) of the statutes on claims for loss or damages because of bodily injury or death resulting from accidents caused by motor vehicles and shall report the results of its study to the legislature by July 1, 1989.

SECTION 10. **Nonstatutory provisions; legislative council study.** The legislative council is requested to conduct a study of all of the following and to report the results of its study to the legislature by January 1, 1989:

(1) The impact of required safety belt usage under section 347.48 (2m) of the statutes on the number of traffic fatalities and the number and severity of other traffic injuries in this state.

(2) The number of prosecutions undertaken and the amount of forfeitures received as a result of the enforcement of the safety belt use requirements under section 347.48 (2m) of the statutes.

(3) The number of vehicles with automatic occupant restraints in use in this state and the impact of these automatic occupant restraints on the number of traffic fatalities and other traffic injuries in this state.

SECTION 10g. **Nonstatutory provisions; public instruction; pupil passenger safety standards study.** The department of public instruction shall study the effectiveness of pupil passenger safety standards on school buses. The study shall include an analysis of the use of safety belts on school buses having a gross weight of more than 10,000 pounds under any voluntary pilot program providing for installation of safety belts on those school buses. The study shall also include an analysis of existing safety belt use in small school buses and vans, liability issues related to pupil passenger safety and any other factors which are of concern to the Wisconsin association of pupil transportation directors. The department of public instruction shall report the findings of the study to the presiding officers of each house of the legislature for referral to the appropriate standing committees of each house of the legislature by July 1, 1988.

SECTION 10m. **Nonstatutory provisions; transportation.** The secretary of transportation shall, until April 2, 1989, monitor the enactment of safety belt usage laws meeting the criteria under 49 CFR 571.208 S4.1.5. Immediately upon determining that such laws would, with the inclusion of this act, be applicable to not less than two-thirds of the population of the United States, based on the 1980 federal census of population, the secretary shall so certify to the governor and the revisor of statutes.

SECTION 11. **Terminology changes.** (1) TRANSPORTATION. (a) *Safety belts.* Wherever the term ""Properly restrained"" appears in the following section of the statutes, the term "In this subdivision, "properly restrained"" is substituted: 347.48 (4) (a) 1 and 2.

SECTION 12. **Effective date.** This act takes effect on the first day of the first month commencing after publication.

Wisconsin Briefs from the Legislative Reference Bureau

Brief 86-7 June 1986

KEEPING KIDS SAFE ON SCHOOL BUSES: THE SEAT BELT QUESTION

I. INTRODUCTION

Twenty-five states and the District of Columbia have enacted mandatory motor vehicle seat belt usage laws for most drivers and passengers. All 50 states have motor vehicle child safety restraint laws. No state has enacted mandatory seat belt installation and usage on all school buses, although 42 school districts in 14 states do have such a requirement. In this context, "motor vehicle" primarily means automobiles and other noncommercial use vehicles, and "child" means one who is age 4 or younger.

Table 1: Seat Belt Laws

Mandatory Seat Belt Usage Laws (25 States)		Child Safety Restraint Laws	State School Bus Seat Belt Laws	School Districts with Mandatory Seat Belt Usage on All School Buses (42 districts in 14 states)
California	Missouri	All 50 states	None	Arizona
Connecticut	Nebraska			Connecticut
Hawaii	New Jersey			Georgia
Idaho	New Mexico			ILLINOIS
ILLINOIS	New York			Kansas
Indiana	North Carolina			Maryland
IOWA	Ohio			Massachusetts
Kansas	Oklahoma			MICHIGAN
Louisiana	Tennessee			New Jersey
Maryland	Texas			New York
Massachusetts	Utah			Oregon
MICHIGAN	Washington			Pennsylvania
MINNESOTA				Vermont
	Dist. of Columbia			Virginia

Nevertheless, the question of requiring the installation and usage of school bus seat belts persists. Wisconsin considered such legislation in the 1985 Legislature (1985 Senate Bill 214 and 1985 Assembly Bill 527), but the measures failed to pass. The most recent prior proposal on the subject was offered in 1977, when the Wisconsin Legislature considered 1977 Assembly Bill 213, which also failed to pass. As introduced, 1977 Assembly Bill 213 would merely have required school bus drivers to wear seat belts, but Assembly Amendment 2 to the bill would have extended this requirement to all passengers.

As a result of federal motor vehicle safety standards (FMVSS), however, mandatory seat belt installation is required on school buses which have a gross vehicle weight of under 10,000 pounds and carry up to 22 passengers. Larger buses are not covered.

Prepared by Clark G. Radatz, Research Analyst.

Nationally, 350,000 school buses, traveling over 4 billion miles, carry 20 million children per year. In Wisconsin, more than 6,800 school buses daily transport 467,000 pupils to and from classes, and more than 1,600 such buses are also used commercially for nonschool events. In 1984, there were 9 fatalities and 4,200 injuries resulting from school bus accidents nationwide. The Wisconsin record of school bus accidents in the past 6 years indicates:

Table 2: School Bus Accidents in Wisconsin

Year	Accidents	Injuries	Fatalities
1979	1,093	251	6
1980	646	214	1
1981	576	181	4
1982	484	159	4
1983	484	159	3
1984	558	172	1

Source: Wisconsin Department of Transportation.

Although requirements for school bus seat belts have long been considered by the federal government and several state governments, two factors have caused hesitation over adoption. The cost of installation has been a matter of concern. More importantly, there has been a continuing debate over the ultimate safety of the child — whether seat belts increase the safety of the child or cause greater harm. Although a few studies have been made, there still seems to be a lack of scientific data on this issue. The National Safety Council has urged Congress to authorize a study to settle the issue (*Christian Science Monitor*, February 24, 1986).

II. SAFETY STANDARDS FOR SCHOOL BUSES

While debate over seat belts continues, safety on school buses has been promoted in alternative ways by both the federal government and state governments, including Wisconsin, specifically through construction and design requirements.

Federal Regulation of School Bus Construction and Safety Standards

Over the past 20 years, the federal government has gradually established school bus safety standards (Title 49, Chapter V, Part 571, Code of Federal Regulations), administered by the National Highway Traffic Safety Administration (NHTSA). Although seat belts have been considered, the emphasis has been on bus construction and design.

In 1966, Public Law 89-563 authorized the NHTSA to establish improved safety standards for motor vehicles, including school buses. It was not until 10 years later (1976), however, that the final school bus occupant protection rule was issued, becoming effective in 1977 (FMVSS 222). In the meantime, the NHTSA, in 1974, decided that a passive restraint system of occupant containment by use of the seating system in conjunction with a barrier system offered the most reliable crash protection in a school bus accident situation, and abandoned the restraining system option of seat belts, citing "practical objections" raised by the majority of groups commenting on the standards. Thus, the NHTSA has placed the safety of school bus occupants on "compartmentalization" through improving school bus design and construction standards (seat design and construction, rollover protection, body joint strength). Nevertheless, the NHTSA, stated that "it would require the installation of belt anchorages in case school districts wished to install lap belts". When the 1976 rule was issued, however, the NHTSA deleted the requirement for seat belt anchorages. Although petitioned in 1981 and 1983 by such groups as the Physicians for Automotive Safety and the Action

for Child Transportation Safety to reconsider this decision, the petitions were rejected by the NHTSA. When the NHTSA eliminated the requirement for seat belt anchorages, it did require that "strength characteristics of the seat specified by the standard .... provide the strength necessary to absorb seat belt loads" (Federal Register, Volume 41, Number 19, page 4017).

Since 1977, the federal government has required school buses to meet several federal safety standards under Title 49, Chapter V, Part 571, of the Code of Federal Regulations (CFR). In particular, the CFR sections that have the most impact on school bus occupant safety relate to rollover protection, body joint strength and passenger seating and crash protection.

Rollover Protection — Section 571.220 Standard 220 (49 CFR 571.220), which applies to all school buses, establishes school bus structural design and construction requirements to achieve required rollover protection. This standard requires the bus structure to withstand a force equal to 1-1/2 times the unloaded vehicle weight to the roof of the bus to minimize roof crush and to permit escape through the emergency door. The purpose of this standard is to reduce the number of deaths and the severity of injuries that result from failure of the school bus body structure to withstand forces encountered in rollover crashes.

Body Joint Strength — Section 571.221 Standard No. 221 (49 CFR 571.221) establishes school bus body joint strength standards for both interior and exterior body panels and panel joints. Body panels and panel joints, when tested in accordance with prescribed test procedures under Standard No. 221, are required to have the capability of holding the body panel to the member to which it is joined when subjected to a force of 60% of the tensile strength of the weakest joined body panel determined under this standard. The purpose of this standard is to prevent or reduce panel separation in a crash.

Passenger Seating and Crash Protection — Section 571.222 Standard No. 222 (49 CFR 571.222) establishes occupant protection standards for school bus passengers through "compartmentalization". Standard 222 deals with compartmentalization in school buses through a combination of passenger seats and restraining barriers. Compartmentalization is accomplished by creating a small compartment consisting of the passenger seat, the seat back, and the backside of the seat in front of it or the restraining barrier in front when there is no such seat. The purpose of this standard is to reduce the number of deaths and the severity of injuries that result from the impact of school bus occupants against solid interior objects in the bus during crashes or sudden defensive driving maneuvers. The basic requirements established by the standard are:

(1) School buses under 10,000 gross vehicle weight are required to have seats capable of withstanding 5,000 pounds of crash force; school buses of 10,000 pounds or over gross vehicle weight must have seats capable of withstanding 1,500 to 2,200 pounds of crash force. The NHTSA set the higher requirement for smaller buses because of the theory that small van-type bus crashes are likely to be much more violent than those involving the large school buses.

(2) Seats for all school buses are required to have seats with backs 20 inches in height to help prevent whiplash in rear impact crashes.

(3) The backs of all seats are required to be padded to reduce injuries to occupants in frontal impact crashes and to spread the shock of the impact.

(4) Seat backs are also required to yield in an impact in order to help absorb the crash forces instead of the occupant absorbing the crash force.

(5) Restraining barriers are required on school buses to assist in the compartmentalization concept designed for the protection of front seat occupants.

Wisconsin Regulation of School Bus Construction and Safety Standards

Under Section 110.06 (2) of the Wisconsin Statutes (Motor Vehicles), created in 1965, the Secretary of the Wisconsin Department of Transportation is authorized to establish administrative rules deemed "necessary in the interests of safety to cover the design, construction, inspection and

operation of school buses". The current provisions in Chapter Trans 300 of the Wisconsin Administrative Code (Transportation of School Children) were created, effective on March 1, 1983.

Chapter Trans 300 provides for standards and requirements for the transportation of school children. The purpose of this code chapter is "to promote the safe transportation of pupils and other authorized persons in school buses".

Chapter Trans 300, Subchapter II, provides for school bus equipment standards. Several sections parallel the federal safety standards created by the NHTSA. Parallel standards include requirements for rollover protection, body joint strength, and passenger seating and crash protection. A comparison of these sections with the Code of Federal Regulations shows:

Table 3: School Bus Safety Regulations

U.S. Code of Federal Regulations Standards	Wisconsin Administrative Code Standards
49 CFR 571.220 — Rollover Protection	Trans 300.35 — Construction Trans 300.39 — Emergency Exit
49 CFR 571.221 — Body Joint Strength	Trans 300.35 — Construction Trans 300.45 — Frame Trans 300.52 — Interior Trans 300.56 — Mounting of Body
49 CFR 571.222 — Passenger Seating; Crash Protection	Trans 300.27 — Barriers Trans 300.59 — Seating Trans 300.78 — Seats and Restraints

Although there is no mandatory requirement to have seat belts on school buses with a gross vehicle weight rating of 10,000 pounds or over, Section Trans 300.78 of the Wisconsin Administrative Code states that "seat frames may be equipped to accept seat belts or other types of restraints."

Other Wisconsin Provisions Affecting School Bus Safety

Besides requiring design and construction standards, Section 110.06 (2) of the statutes also mandates safety through driver requirements and bus inspection.

Driver Requirements

Driver requirements focus on moral characteristics, driving knowledge and medical standards (Chapter Trans 110, Wisconsin Administrative Code): 1) Moral characteristics to be considered by the department include offenses against public morals (sexual morality, sexual assault, endangering safety by conduct regardless of life, etc.). 2) Driving knowledge considered includes successful completion of an examination on traffic laws, rules of the road, and vehicle equipment together with driving record and driving practices. 3) Medical standards considered include medical condition and history (degree of severity, degree of recovery, hospitalization and physician care).

Bus Inspection

In addition, Section Trans 300.16 requires school bus drivers, prior to the start of any trip, to check the condition of the bus, which includes giving particular attention to brakes, tires, lights, emergency equipment, mirrors and windows.

Inspection of school buses is conducted by the State Patrol Division, Wisconsin Department of Transportation, as authorized by Section 110.06 (2) of the statutes and Section Trans 300.87 of the code. The Bureau of District Operations of the State Patrol indicates that all school buses are inspected annually.

III. INSTALLATION OF SEAT BELTS ON SCHOOL BUSES

Types of Seat Belts

There are 2 types of seat belts — "safety belt" and "restraining belt". A "safety belt" is a "safety seat restraint system", which includes the belt, buckle, and anchorage to the seat frame; the seat structure itself; and the anchorage of the seat frame to the floor frame. It is also capable of withstanding a crash force of 5,000 pounds per passenger. A "restraining belt" is a "lap belt or convenience belt", which "merely keeps a passenger from sliding out of the seat". It is not required to meet any performance standards.

Seat belts can be installed on school buses either during construction of the bus or after construction (retrofitting).

The options for installing seat belts on school buses which bus manufacturers can use include:

(1) Using the seats that are installed on small buses, which are required to have seat belts. This seat is equipped with seat belts and also has an additional leg support and braces in order to withstand the added force that a seat belt would concentrate in a crash.

(2) Bolting the seat belt to the seat frame.

(3) Anchoring the seat belt to the floor.

(4) Wrapping the seat belt around the seat frame.

(5) Providing predrilled holes in the seat frames to allow for retrofitting school buses with seat belts if desired at a later date.

A Sampling of Installation Policies

A survey conducted by the Physicians for Automotive Safety (reported in its *PAS News*, Spring-Fall 1980) indicated that some bus manufacturers install seat belts at the time of purchase and also retrofit after purchase, some install seat belts at time of purchase only, and some have commented that the seats used are not designed to sustain the additional stress caused by seat belts and therefore cannot be installed. Further details were:

(1) Wayne Corporation: The company is prepared to install seat belts at the time of purchase. The company uses seats identical to those used in smaller buses that are required to have seat belts. For retrofitting options, seat frames have predrilled holes to accommodate seat belt assemblies. However, the addition of brackets is needed to reinforce the seat frame at the point of the seat belt anchorage.

(2) Superior Bus Company: The company installs seat belts at the time of purchase only. Brackets for anchoring seat belt assemblies must first be welded to the seat frame. Retrofitting installation is not possible.

(3) Blue Bird: The company indicated that "seats used were not designed to sustain belt loads and belts could therefore not be installed".

(4) Thomas Built Buses, Inc.: "Seats in full-size buses were not intended to sustain belt loads and belts could therefore not be installed .... in addition, the design of their seats did not lend itself to belt installation.".

(5) Carpenter Body, Inc.: The company installs seat belts in large school buses.

In retrofitting school buses with seat belts, the Office of Vehicle Safety Standards of the National Highway Traffic Safety Administration (NHTSA) cautioned:

(1) Seat belts should never be added to buses manufactured before 1977 (the year current safety standards became effective), because pre-1977 buses have seats with an exposed rail. "Because of

the dynamics of a crash, lap belts would actually increase the force with which an occupant's head would strike the rail".

(2) Although the NHTSA believes that it is safe to attach seat belts to seats in buses manufactured after 1977, it is suggested that when retrofitting a school bus:

(a) Ascertain that seat belts meet Federal Motor Vehicle Safety Standard 209; and

(b) If the bus manufacturer sells buses that have a seat belt option, check to see how seat belts are installed and, if possible, follow the manufacturer's installation procedures.

IV. STATE LEGISLATION

Wisconsin Legislation

During the 1985-86 Session, the Wisconsin Legislature considered several proposals which would have established mandatory seat belt usage in motor vehicles. Among these proposals were 2 bills, 1985 Senate Bill 214 and 1985 Assembly Bill 527, which would have required the installation and usage of seat belts on school buses that are currently exempt by federal safety standards. School buses that are exempt by federal safety standards are those vehicles with a gross vehicle weight rating of 10,000 pounds and over.

1985 Senate Bill 214 and 1985 Assembly Bill 527 were companion bills (identical except for the effective date for seat belts), introduced on May 9, 1985, and October 8, 1985, respectively. Referred to their respective committees on transportation, both bills received a joint public hearing by these committees on February 12, 1986, but failed to pass the Legislature on April 2, 1986 and March 26, 1986, respectively.

The following analysis by the Legislative Reference Bureau appeared in SB-214 and AB-527:

"Under federal law, no state or political subdivision of a state may establish a safety standard for motor vehicles or motor vehicle equipment which is not identical to the federal standard which applies to the same aspect of performance. A state or political subdivision may, however, establish a higher safety standard for motor vehicles or motor vehicle equipment procured for its own use.

"Currently, federal safety standards do not require a school bus having a gross vehicle weight rating of more than 10,000 pounds to be equipped with passenger safety belts. A school district which procures school buses for its own use, however, may require and equip its buses to meet a higher safety standard than that established under the federal regulations under present law.

"This bill directs the Wisconsin department of transportation (DOT) to promulgate a rule requiring a school bus having a gross vehicle weight rating of more than 10,000 pounds and which is manufactured on or after September 1, 1989, to be equipped with safety belts at each designated seating position. The rule would be incorporated into any contract for the transportation of school children.

"Currently, the seller of a vehicle to be used as a school bus must obtain a presale inspection of the vehicle and may be required to make any repairs and improvements necessary to comply with DOT's rules relating to school bus design and construction. The bill requires the purchaser of the vehicle, that is, the school district or bus company, to make the changes necessary to comply with the rule on safety belt installation. DOT is directed to submit the rule in final draft form no later than 6 months after the bill takes effect."

[Note: The effective date for 1985 AB-527 would have been September 1, 1987.]

Selected Other States

Several states have been considering legislation related to school bus seat belts.

Connecticut

The Connecticut Legislature considered 1985 House Bill 5749, which would have required school buses to be equipped with seat belt anchorages, and 1985 House Bill 5747, which would have created a commission on school bus safety to study the issue. Both failed to pass. The Connecticut Coalition for School Bus Safety strongly favored school buses equipped with seat belts. The Connecticut Office of Legislative Research, however, has described the Legislature as uneasy about passing such a law without a more conclusive study.

Illinois

The Illinois Legislature considered 1985 Senate Bill 6 and 1985 House Bill 1, which would have required seat belts on all school buses. Both proposals were tabled as of May 27, 1986. Favoring these proposals was the Illinois Coalition for Seat Belts on School Buses. Diane Schlair, a member of this group, has stated that the primary purpose of seat belts is to keep passengers in their seats, thereby minimizing the possibility of injury or death. Opposing these proposals was the Illinois School Transportation Association. Noel Biery, president of this association, declared that seat belts could be a hazard, are unnecessary, and are too costly.

South Carolina

1985 House Bills 2335 and 2339, concerning seat belts on school buses, were introduced in the South Carolina Legislature, but both failed to pass. In contrast to the Connecticut Coalition for School Bus Safety, the South Carolina Association for Pupil Transportation has recommended "no action on seat belts until tests prove their need".

Virginia

On a local level, the Fairfax County School Board decided to test seat belts on school buses through a pilot program, which began in January 1986. The purpose of the pilot program is to observe how students follow the requirement to wear seat belts and to determine how safe the belts are in crashes.

V. SHOULD SEAT BELTS BE REQUIRED ON SCHOOL BUSES?

In pursuit of the common goal of improving school bus safety, various groups have taken opposite positions on the seat belt issue. The National Coalition for Seat Belts on School Buses, the Physicians for Automotive Safety, and Action for Child Transportation Safety have all supported seat belts, while the National Safety Council, the National Highway Traffic Safety Administration, and school bus associations have not. What are the various facets of the question that are being contended by the opposing groups?

Safety Differences of Buses and Cars

In a December 28, 1985, rebuttal to a *New York Times* editorial, Mr. William A. Lathrop, Administrative Assistant and Director of Student Transportation for the Ramapo (New York) Central School District, pointed out 4 primary differences between automobiles and school buses:

(1) "In designing school buses, efforts have been made to eliminate protruding objects that could injure passengers during a crash. Automobiles, in contrast, contain many hostile objects, such as steering wheels, windshields, gear shifts, knobs and handles near all passengers.

(2) "The size difference between an automobile and a school bus is obviously enormous. Although there are no guarantees, the larger the vehicle, generally the greater the safety.

(3) "School-bus passengers are protected by a compartmentalized seating area....

(4) "School buses are surrounded by a heavy metal frame; most automobiles have little reinforcement".

The Safety Record of School Buses

As indicated statistically both on a national and state level, school buses are considered to be the safest mode of mass transportation on the highway. In its June 1985 monthly report, the National Highway Traffic Safety Administration stated: "In view of the effectiveness of the current safety standards, and the excellent safety record of school buses generally, we do not believe that a federal requirement for safety belts is warranted".

Efficacy of Current Structure and Equipment

Complaints about school bus safety effectiveness are based on the primary safety standard of "compartmentalization". "Compartmentalization" is accomplished by creating a small, well-padded area for the passengers in the school bus. "Compartmentalization" is intended to cushion passengers in the event of an accident. However, it has been contended that "compartmentalization while important, does not adequately protect students in rollover and side collisions, which account for two-thirds of occupant school bus fatalities". Subsequently, "Unbelted children .... during a crash .... become human missiles as they are thrown into each other, into the unpadded areas of the bus and into aisles, thus blocking the quick evacuation of others".

Seat Belts as a Teaching Device

Today, young children are required to be in a "child restraint safety device" when traveling in an automobile or other type of motor vehicle such as a pickup truck or family van. Thus, they are learning the importance of seat belts and how to use them for safety. Still, the children who are not under the mandate of "child restraint safety device" laws most likely lack such knowledge and experience.

Consequently, it has been contended that "safety belts on school buses would be a valuable educational tool to teach young people the importance of using seats belts" and that it is also contradictory and confusing for children to be required to wear seat belts in cars and then not have the opportunity to do the same on large school buses.

Seat Belts as a Possible Cause of Injuries

Surrounding the issue of equipping large school buses with seat belts is the question of whether seat belts themselves cause injuries. It has been asserted that seat belts could possibly cause pelvic injuries and other injuries through misuse, hazards and entrapment.

(1) *Pelvic injuries:* Opponents fear that seat belts could cause pelvic injuries to small children in the event of a crash. For example, young children may be incapable of correctly adjusting their seat belts alone, and an improperly fastened seat belt is worse than no seat belt at all. Furthermore, in the event of a crash, the seat belt would remain attached to the floor, but the seat could rip off the floor causing pelvic injury. In response, proponents have stated that "any injury sustained by passengers due to seat belts would, in nearly all cases, be far less severe than the resulting injuries caused by no seat belts being used".

(2) *Misuse:* Opponents have asserted that misuse of seat belts in school buses through "horseplay" could cause injury to students. Proponents have countered that this is generally not a problem and that lunch boxes are used more in "horseplay" than seat belts.

(3) *Hazards:* Opponents have noted that tripping over seat belts while walking in the aisle of a school bus could be a hazard to students. Proponents have contended that "seat belts have not proven to be a tripping hazard as the belts will not reach the floor if the short ends are installed on the aisle side and the long ends are installed on the wall side and are proper length".

(4) *Entrapment:* Opponents are concerned with the possiblity of the seat belts causing entrapment of students in a burning school bus and not allowing for the quick evacuation of the students. In

response, proponents have argued that in the event of a crash, belted students are more likely to remain conscious and will be better able to escape from the bus if that becomes necessary.

The Study of Seat Belts on School Buses

In 1984, Transport Canada conducted barrier crash tests of 3 school buses to determine the adequacy of current occupant protection regulations and the effect of seat belts on the level of occupant protection. The test results indicated that, in a severe frontal collision, the current occupant protection system provides excellent protection for students. In addition, the use of seat belts could cause more severe neck and head injuries. It should be noted, however, that these tests did not investigate the effect of side impacts or rollovers on occupant injury.

In this light, the National Transportation Safety Board is studying crashes of post-1977 large school buses to ascertain whether safety standards are protecting passengers adequately. The board was expected to complete its study by the end of 1985. However, the board is considering expanding the study to include crash investigation of vans equipped as school buses and other small school buses. As part of the study, the board is seeking to evaluate whether buses should be equipped with seat belts. Board officials have indicated that "One of the major problems with evaluation of lap belts is the lack of school bus injury data". Further, "In accidents we have seen so far, there is no clear pattern emerging that indicates that lap belt installation would have made that much of a difference in serious or fatal injuries on large buses".

Cost of Installing Seat Belts on School Buses

When questions concerning the cost of installing seat belts on school buses are raised, they receive various responses and answers. Estimated cost vary from approximately $1,230 (Wayne Corporation) per bus to $3,000 (Council on Road Trauma of Hamilton, Ontario, Canada). An estimate of cost for installing seat belts on 66-passenger school buses (costing $30,000 to $35,000), prepared by the National Coalition for Seat Belts on School Buses, March 1985, shows:

Table 4: Seat Belt Cost Comparison

School Bus Manufacturers	Cost per Bus
American Transportation Corp. (Ward); Conway, Arizona	$2,000 approx.
Blue Bird; Ft. Valley, Georgia	$1,870
Carpenter Body, Inc.; Mitchell, Indiana	$1,650
Thomas Built Buses, Inc.; High Point, North Carolina	$1,400
Wayne Corp.; Richmond, Indiana	$1,230

In the fiscal estimates for 1985 Senate Bill 214 and 1985 Assembly Bill 527, the Wisconsin Department of Public Instruction indicated that "Based on industry data, it is estimated a requirement for safety belts at each seating position would add an average $2,500 to the cost of placing a new school bus in operation". In contrast, on January 16, 1985, the Alaska House Research Agency reported that the Alaska Department of Education, Pupil Transportation Office, estimated that it would cost approximately $1,400 per bus to install seat belts.

As indicated, the cost of installing seat belts on school buses can be estimated to vary from $1,230 to $3,000 per bus — but why? It is possible that cost figures vary due to different factors needed to accomplish the required task and also to the differences between installing seat belts during construction versus the retrofitting of buses with seat belts after construction. In a January 1985 report, the Alaska House Research Agency stated that installing seat belts and using seat belts on school buses may involve numerous costs including: 1) prices of seat belts and special seats (if used); 2) labor and maintenance costs; 3) bus monitors to ensure seat belt usage; and 4) perhaps, increased insurance rates. Furthermore, because of the lack of federal safety standards or guidelines, bus manufacturing companies installing seat belts on school buses may use a variety of methods of

installation. Thus, the cost of installing seat belts during bus construction or retrofitting a school bus with seat belts after construction is dependent upon the method used — making it difficult to produce an exact figure.

VI. SOURCES

In addition to the Wisconsin Statutes, Wisconsin Administrative Code and U.S. Code of Federal Regulations, the following sources were used:

Alaska House Research Agency, "Cost and Safety Implications of Seat Belts on School Buses", January 1984.

Alaska House Research Agency, "Installation of Seat Belts in School Buses", October 1984.

California Highway Patrol, "A Study Relating to Seat Belts for Use in Buses", March 1976 (380.7251/C1).

Insurance Institute for Highway Safety, Status Report, "School Buses and Seat Belts", May 11, 1985.

Journal of American Insurance, "Should School Buses Carry Seatbelts?", Fourth Quarter 1985.

National Conference of State Legislatures, NCSL Pointer, "Mandatory Seat Belt Laws", April 1985.

New York Legislative Commission on Critical Transportation Choices, "School Bus Safety in New York State .... Children at Risk?", January 1985.

Wisconsin Legislative Reference Bureau, *Clippings*, MOTOR VEHICLES SAFETY EQUIPMENT (380.7251/W7z and Z).

Wisconsin Legislative Reference Bureau, *Clippings*, SCHOOLS — TRANSPORTATION OF PUPILS (373.4/Z).

VII. APPENDIX : THE NEW YORK LAW

Since the Legislative Reference Bureau issued Wisconsin Brief 86-7, "Keeping Kids Safe on School Buses: The Seat Belt Question", in June 1986, *one* state has enacted a statewide school bus seat belt law. On July 30, 1986, New York Governor Mario Cuomo approved Chapter 747, Laws of 1986, "Seat Safety Belts for School Buses". Its effective date was 30-days after becoming law.

This appendix will examine New York's law, focusing on such areas as: affected buses, seat belt installation and usage, state aid for installation costs, and personal injury liability.

Affected School Buses

New York's 1986 Chapter 747 applies to 2 categories of school buses: 1) all new school buses which are manufactured for use in the state on or after July 1, 1987; and 2) existing school buses which were manufactured since April 1, 1977. This new law, however, prohibits the retrofitting of existing school buses manufactured prior to April 1, 1977. Its provisions apply to both public and nonpublic schools.

New school buses manufactured on or after July 1, 1987 are required to be equipped with lap seat belts and extra padding along the tops and backs of the seats. Existing school buses manufactured and in use between April 1, 1977 and June 30, 1987 *may be* retrofitted with seat belts and additional padding *at the option of local school boards*. Pre-April 1, 1977 school buses are prohibited from being retrofitted. It is felt that school buses build before April 1977 have design characteristics which do not lend themselves to proper seat belt installation.

The state Commissioner of Transportation is authorized by 1986 Chapter 747 to adopt rules and regulations regarding the type and specifications of seat belts and increased seat back padding. The commissioner also has the power, by rule, to exempt certain design school buses from retrofitting. However, in granting such an exemption, the commissioner is required to consider safety factors, structural integrity of the buses and any other items deemed necessary to preserve the safety and welfare of the passengers. The commissioner is also specifically prohibited by law from authorizing the retrofitting of any pre-April 1, 1977 school bus.

Seat Belt Installation and Usage

The New York law is a combination of state requirements and local options. As stated above, it requires seat belts to be standard equipment on new school buses, but the law does not mandate that seat belts on school buses actually be used by passengers. Local options play a large role in the retrofitting of existing school buses and in the required use of seat belts on both new and old buses.

Following a state-required public hearing, local school boards may, *at their discretion*, decide:

(1) Whether the district should install seat belts on all or some school buses purchased and/or contracted for prior to July 1, 1987 (the law's initial applicability date);

(2) When such installation should be provided; and

(3) On all buses equipped with seat belts, whether their *use shall be required* (after a specified date determined by the local board).

At the public hearing, the local school board is to also address the question of the effect of seat belt installation on the total number of students that can be transported on such buses. It should be noted that the number of seat belts allowed per seat could affect load factors and consequently the cost of transporting pupils.

According to the New York Department of Transportation, school districts would have to conform to the following specifications regarding the number of seat belts: 1) if a bus seat is under 39 inches — only 2 pairs of seat belts are to be installed; and 2) for bus seats of 39 inches (or more) — 3 pairs of seat belts may be installed.

The New York Department of Education has indicated that it anticipates no significant change in current student transportation policies and costs. This estimate is based on the theory that load

factors will balance out because most school districts would be able to have 3 sets of seat belts per seat, and — depending on the physical size of passengers — at various times the districts would be transporting either a greater or lesser number of students per bus.

Personal Injury Liability

The New York law provides a personal liability exemption regarding seat belt usage. This liability exemption is applicable only if the buses and associated equipment are maintained in operating order, and if those persons involved have complied with the applicable statutes, rules or regulations. Persons involved include bus drivers, matrons or monitors, teachers, chaperones or volunteers, the school board and school bus operators.

Specifically, the law provides that in any action by a school bus passenger for personal injuries, the named persons shall not be held liable *solely* because the injured person was not wearing a seat belt.

Seat Belt Costs and State Reimbursement

As an incentive to retrofit existing school buses with seat belts and extra padding, 1986 Chapter 747 authorizes partial state reimbursement to local school districts for costs incurred. This reimbursement provision is part of a program of state assistance established for school bus safety which includes the purchase of 2-way radios and stop-arms.

More specifically, the new law empowers the New York Department of Education to reimburse 90% of the "approved transportation expense .... for the purchase and installation of seat safety belts".... incurred by the school districts. An approved transportation expense is defined as the "actual expenditure".

This cost reimbursement provision does not apply to school districts which are currently using seat belts on school buses or have installed or have contracted to install seat belts prior to July 1, 1987. At least 4 school districts are in this situation (Ardsley, Comsewogue, Greenburgh Central and Suffolk County).

For a new 66-passenger school bus, the New York Department of Transportation has estimated the cost for installing seat belts and additional padding would be approximately $1,500 per bus ($1,300 for belts and $200 for padding). When it comes to retrofitting, however, the department has indicated the cost could escalate to an estimated $12,000 to $15,000 per bus because New York specifications are more stringent than federal requirements. As a result, when local school boards review eligible buses for retrofitting they could possibly find it necessary to totally replace the seats — not just add seat belts and padding.

Seat Belt Instruction

Under New York's law, the state Commissioner of Education is required to adopt rules requiring instruction on the use of seat belts for school bus operators, drivers and student passengers. This is similar to existing rules relating to school buses which mandate that drills in safe boarding, exiting and emergency procedures be conducted.

Purpose of Chapter 747, Laws of 1986 (New York)

In its summary for 1986 Chapter 747, the Legislature included a memorandum by a legislative representative from the City of New York giving the following reasons for supporting the law:

> "New York City recognizes the enhanced safety that seat belts provide to passengers in motor vehicles and commends that State's continuing efforts at improving motor vehicle safety.
>
> "Of utmost concern to the City is ensuring the safety of school children when they are traveling on school buses. The City would like to see injuries from school bus accidents

significantly reduced if not entirely eliminated. We believe that requiring safety belts for passengers in school buses is a positive step in that direction.

"In addition, we believe that the increased padding on seat backs required by this bill would maximize the safety benefits afforded from the school bus design standards set by the National Highway Transportation Safety Administration in 1977."

See pages 2 and 3 of Wisconsin Brief 86-7 for information on the National Highway Transportation Safety Administration school bus design safety standards.

In a memorandum issued in conjunction with approving 1986 Chapter 747, Governor Mario Cuomo stated (in part):

"New York State is a leader in the area of highway safety. In 1984, we became the first State in the nation to require use of seatbelts in passenger motor vehicles. The seatbelt law, in addition to our other highway safety initiatives, have resulted in a dramatic decline in highway fatalities and injuries.

"New York State also is committed to continuing improvements in the area of school bus safety. Each day, approximately two million students are transported in school buses to and from school, sports events and field trips. In 1985, the school buses transporting these children traveled a total distance of more than 300 million miles. While the school bus industry in the State has compiled one of the best safety records in the nation, we must continue to consider ways to make the system even safer.

"This measure will assist us in our efforts to further improve school bus safety. While some opponents of the measure argue that the safety benefits of seatbelts on school buses are inconclusive, their arguments are based on a Canadian crash test study which considered only frontal crashes in buses with low seat backs. It did not involve any buses with the higher seat back contained in the New York fleet, which is a substantial factor in increasing the safety benefits of seatbelts. Another study undertaken by the University of California at Los Angeles involved buses with a high seat back and is more germane to the New York experience. That study concluded that seatbelts provide substantial additional protection to school bus passengers seated in high back seats with efficient padding.

"Based on the foregoing, I believe that this measure will enhance the protection afforded to children on school buses and further improve school bus safety.

"Approval of the bill is recommended by Department of Motor Vehicles, the Consumer Protection Board, the Department of Transportation, the New York State Trial Lawyers Association, Inc., the Office of the Mayor of the City of New York and the American Academy of Pediatrics."

Wisconsin Briefs from the Legislative Reference Bureau

Brief 87-4 April 1987

SEAT BELTS AND AIR BAGS: A SUMMARY OF ISSUES
April 1987 Update

Introduction

Since our first examination of the seat belt debate in August 1985 (Brief 85-3), Massachusetts and Nebraska have repealed mandatory seat belt use laws. Thirteen additional states have enacted legislation. The U.S. Department of Transportation (DOT) rule has survived judicial challenge and additional data is available on the effects of mandatory use laws. Information on these and other new developments is included in this update.

A July 1984 U.S. DOT rule requires installation of some type of automatic passenger protection devices on all automobiles beginning with the 1990 model year. If, however, two-thirds of the population of the United States are covered by state laws requiring drivers and passengers to wear currently installed seat belts by September 1, 1989, the rule requiring automatic protection devices will be rescinded. Consequently, the department's rule has forced active state debate on how best to protect the occupants of automobiles during accidents. The failure of a state to adopt a mandatory seat belt use law puts that state's population into the category supporting the adoption of the federal automatic restraint device rule. Inaction becomes action.

The specific question each state legislature must answer is whether to adopt a law requiring passengers and drivers to wear the seat belts installed in their cars. In making that decision, questions arise on the effectiveness of various types of devices designed to protect the car's occupants. There is also the philosophical question of whether a state should require use of seat belts when the majority of the population fails to use them on a voluntary basis.

As of April 1987, 25 states enforce some form of a mandatory seat belt use law.

There are 5 bills under consideration in the 1987 Wisconsin Legislature which would establish a mandatory seat belt law. 1987 Senate Bill 7 has passed the Senate. This bulletin is designed to summarize the issues involved in the debate.

Types of Restraint Systems

A "seat belt" has been included as standard equipment on cars sold in the United States since 1964. A "seat belt" is a fabric strip which can be fastened across a person's lap to prevent the person from being propelled into hard surfaces — the steering wheel or windshield — or out of an automobile in an accident. Since 1968, cars have also been required to have a shoulder belt to improve protection. Statistical evidence indicates that seat belts — when worn — significantly reduce injuries. Unfortunately, less than a third of the American motoring public use the seat belts installed in their cars in states without mandatory use laws. Prior to the current surge in publicity, usage was about 13%. Most currently installed seat belts are "manual". They require a positive act on the part of the car's occupants. The passengers and driver must pull the belts around their bodies and fasten them. Most of us do not do so. Repeated efforts have been made to persuade people to

Prepared by A. Peter Cannon, Research Analyst.

wear the installed seat belts. Numerous public education campaigns have been tried with no long-term success in raising seat belt use levels. 1974 and 1975 model automobiles had either a loud, persistent buzzer or an interlock system that required the seat belt to be fastened before the engine would start. Reaction to these systems was so negative that the U.S. Congress forbade their use.

Continuing failure to improve usage of seat belts has led to discussion of a variety of "automatic" or "passive" restraint systems. Since people will not actively take steps to provide protection, then why not try a system which would not require a positive action, one that would work automatically? Current technology provides two different systems. One is a modification of the familiar seat belt, but designed so that the belt automatically encloses the occupant's body when the car door is closed. There are several different versions of automatic belts. Some include a knee bolster to prevent occupants from sliding under the dash rather than a lap belt and, thus, have only a shoulder belt. Some are detachable. Automatic belts are already available on some models from some manufacturers.

The other currently available option is the "air bag". In this system a sensor detects a crash of 12 miles per hour or over and deploys a fabric bag inflated with nitrogen. The bag absorbs the blow rather than allowing the occupant to hit the interior of the car. It deflates within a fraction of a second to allow road vision and control. Air bags have been ordered for some fleet cars in use by the federal and some state governments and are expected to be available on certain models offered by at least 7 manufacturers by the end of 1987.

Another option is to design the interior surfaces of the automobile so that they do not do damage in a crash. "Friendly" interior surfaces are being pursued, but are not ready to be put into production cars at this time.

The U.S. Supreme Court Decision

The current U.S. DOT rule is the result of more than a decade of discussion on requiring installation of automatic restraint devices, including, most recently, a ruling by the U.S. Supreme Court.

The National Traffic and Motor Vehicle Safety Act of 1966, as amended, directed the U.S. DOT to "reduce traffic accidents and deaths and injuries to persons resulting from traffic accidents". Because the agency decided that automatic restraints offered an effective way to reduce accidents and deaths, in 1977, U.S. Secretary of Transportation Brock Adams announced that all large cars beginning with the 1982 model year, all medium-sized cars beginning with the 1983 model year, and all cars beginning with the 1984 model year would have to have front-seat passive protection devices.

The following sequence of events occurred:

In February 1981, U.S. Secretary of Transportation Andrew Lewis delayed the beginning date for the 1977 rule by one year.

In October 1981, the National Highway Traffic Safety Administration, the part of U.S. DOT which carries out programs relating to motor vehicle safety and equipment, cancelled the rule.

The department based its 1981 rescission of the order to install automatic restraint devices on changes in the U.S. automobile industry. The agency felt that it had become apparent that the automobile industry planned to meet the standard promulgated in 1977 by installing automatic seat belts which could be detached on about 99% of all automobiles. Since a detachable belt does not provide automatic protection after being detached unless the operator reattaches it, the agency thought that the merits of the rule had become suspect. There was no way to know whether consumers would leave detachable automatic belts in operation. If most belts were detached and not reattached, then there would be little difference in protection over current manual seat belts. Thus, there was no basis for concluding that the rule would lead to an increase in safety, and therefore, it could not justify the substantial cost of installing a new seat belt system in every new car.

In November 1981, State Farm Mutual Automobile Insurance Company asked for court review of the rescission.

In May 1982, the U.S. Court of Appeals for the District of Columbia overturned the rescission.

In June 1983, the U.S. Supreme Court upheld that decision, although on different grounds from the Court of Appeals, in *Motor Vehicle Manufacturers Association v. State Farm Mutual* (463 U.S.29, 1983).

The U.S. Supreme Court found that the department's decision to rescind the rule was arbitrary and capricious because the department did not present an adequate explanation for its decision to rescind the order. Specifically, the department failed to explain why it did not require that the order be complied with, by installation of air bags or nondetachable automatic seat belts, if it felt that the increased safety offered by automatic devices could not be met through detachable automatic seat belts.

As a result of the Supreme Court decision, the U.S. Department of Transportation issued a "Notice of Proposed Rulemaking" in October 1983, reviewed the information received as a result of that notice, and issued a new rule in July 1984.

The U.S. Department of Transportation Rule

The rule promulgated by U.S. Secretary of Transportation Elizabeth Dole in the July 17, 1984, *Federal Register* provides either for the installation of automatic restraint systems or passage of state laws requiring use of manual seat belts. According to Mrs. Dole, this approach provides the maximum amount of choice on the best way to increase occupant protection, but still guarantees a substantial increase in the level of protection offered to the public. The analysis of the rule in the *Federal Register* states: "Regardless of the ultimate course the country takes, the end result will be a significant improvement in automobile safety, which is the Department's goal".

The rule requires a gradual phase-in of automatic restraint devices, but does not specify the type of device. Anything which meets minimum standards of protection in a 35-mile-per-hour crash is acceptable. At least 10% of all cars manufactured after September 1, 1986, must have automatic occupant protection devices. On September 1, 1987, the requirement goes to at least 25%; after September 1, 1988, 40%; and after September 1, 1989, all new cars must have automatic occupant crash protection. The department justifies the length of time before requiring 100% compliance as necessary to allow manufacturers ample lead time. The agency thought that a shorter lead time would discourage technological innovation, and lead to all cars being equipped with automatic seat belt devices at the expense of air bags or passive interiors or some other unexplored technology. To encourage experimentation and use of options other than automatic seat belts, the rule allows extra credit in meeting the percentage requirements for manufacturers who use a system other than automatic belts. Credit can be earned with a driver-side air bag and a standard lap and shoulder belt for passengers rather than automatic restraints for both front seat occupants. The National Highway Traffic Safety Administration has proposed extending this credit through the 1984 model year. After that time, passenger side air bags would also be required.

As an alternative to requiring the equipping of all new automobiles with automatic occupant protection devices, however, the U.S. Department of Transportation proposed that states require by law that drivers and front-seat passengers wear the seat belts already installed in automobiles. If two-thirds of the population of the United States is covered by mandatory use laws passed by April 1, 1989, effective not later than September 1, 1989, then the Secretary of Transportation will rescind the requirement that new cars be equipped with automatic protection devices.

The mandatory use laws passed by the states must meet the following requirements:

(1) Each outboard front seat occupant of a passenger car must have a seat belt properly fastened at all times while the vehicle is in forward motion;

(2) No waivers may be allowed except for verified medical reasons;

(3) The law must include a penalty of at least $25 (which may include court costs) for each violation, with a separate penalty for each person violating the law;

(4) There must be a requirement that violation of a mandatory use law by any person involved in an accident may be used to mitigate damages sought by that person;

(5) The state must establish prevention and education programs to encourage compliance with the mandatory use law; and

(6) The state must establish an evaluation program and report information on its experiences with mandatory use laws to the U.S. Department of Transportation.

The agency justifies the option of mandatory use laws on the basis of the speed with which lives could be saved if people actually used already installed seat belts. There is general agreement that, when used, seat belts are very effective in reducing injuries in automobile crashes. Because they have been standard since the 1964 model year, virtually all cars now on the road have seat belts. The Wisconsin Department of Transportation estimates that 96% of the automobiles registered in Wisconsin have seat belts. If 80% of the population complied with a law requiring the use of seat belts, then 80% of the population would receive the protection of seat belts immediately. Since experts estimate that it takes 10 years before a new item of equipment is present on all cars, it would be 10 years before all of the population were protected by whatever automatic protection devices manufacturers begin installing in 1989 model cars. Thus, only owners of the 1989 model cars would be protected in the first full year of operation of the department's rule, while everyone who complies with a mandatory use law will be protected at once. As a result, the short-term benefits of mandatory use laws are greater than automatic restraints, regardless of the relative effectiveness of either system.

State Farm Mutual challenged the mandatory use law option in the agency's rule in the U.S. Court of Appeals. The three-judge panel refused to decide on the question because the court felt that "the evidence before us indicates that the possible rescission about which petitioners are vexed will likely never occur." The court noted that, of the 20 states which had passed mandatory use laws when the decision was written, none appeared to comply with the U.S. DOT requirements and thus it was unlikely that the passive restraint standard would be rescinded.

The state of New York also challenged the U.S. DOT rule. New York questioned the option of meeting the requirement with automatic seat belts which could be detached. New York wanted a rule which required air bags and nondetachable seat belts. The court decided that the U.S. DOT had advanced adequate reasons for not requiring nondetachable seat belts and air bags and that the rule was not arbitrary and could stand. The U.S. Supreme Court rejected New York's appeal of the Court of Appeals decision in March 1987.

Effectiveness of Restraint Devices

It is very difficult to evaluate the effectiveness of any type of equipment designed to protect the occupants of an automobile during a crash because of the many variables involved in a crash. Some accidents are not survivable under any existing technology. The U.S. Department of Transportation judged that the manual lap and shoulder belts currently installed on most cars would reduce fatalities by about 40 to 50% if all automobile occupants wore them. They would reduce moderate to critical injuries by 45 to 55%. The agency believed that these estimates were very reliable since they were based on substantial actual data. Estimates for other systems are less reliable because there is little real experience with them. Automatic seat belts were judged to reduce fatal accidents about 35 to 50% and moderate to critical injuries from 40 to 55%. Estimates were slightly lower than those for manual belts at the lower end of the range because some automatic systems may offer less protection than a lap and shoulder belt, particularly in preventing the occupant's ejection from the vehicle.

Air bags were judged to reduce fatal injuries from 20 to 40% and moderate to critical injuries from 25 to 45%. If a lap and shoulder belt is worn with the air bag, then the combination is judged to reduce fatal accidents from 45 to 55% and less severe injuries from 50 to 60%. All of these estimates are based on reduction in injuries from all crashes regardless of direction, speed or other circumstances. Estimates of the effectiveness of various systems and of the number of lives to be saved by various devices have also been made by other groups. The agency's estimates are used here only because they were the basis for its rule.

Saving Lives

Because of the uncertainties involved in estimating usage of various occupant protection devices, the U.S. Department of Transportation gave ranges rather than specific figures in its estimates of the number of lives that would be saved by various types of restraint devices. The department's table is reproduced below.

Annual Incremental Reduction in Fatalities and Injuries

	Fatalities			Moderate-Critical Injuries		
	Low	Mid-point	High	Low	Mid-point	High
Airbags only	3,780	6,190	8,630	73,660	110,360	147,560
Airbags with lap belts (12.5 percent usage)	4,410	6,670	8,960	83,480	117,780	152,550
Airbag with lap/shoulder belts (12.5 percent usage)	4,570	6,830	9,110	85,930	120,250	155,030
Automatic Belts						
Usage:						
20 percent	520	750	980	8,740	12,180	15,650
70 percent	5,030	6,270	7,510	86,860	105,590	124,570
Mandatory Belt Use Laws (Manual Belts)						
Usage:						
40 percent	2,830	3,220	3,590	47,740	53,440	59,220
70 percent	5,920	6,720	7,510	100,430	112,410	124,570

Source: U.S. National Highway Traffic Safety Administration, *Federal Register*, July 17, 1984.

It should be noted that these estimates are based on the condition of a device being installed in all cars. One of the major arguments the agency makes in suggesting that states adopt mandatory use laws is that they begin saving lives at once. Thus, while air bags are estimated to save 3,780 lives a year, given a 10-year life expectancy for each car, only about 10% of all cars would have air bags in the first year and it is estimated that only 378 lives would be saved by air bags in the first year after they were required. If a mandatory use law were to go into effect at the same time, the agency estimates that even if only 40% of the population used the seat belts, 2,830 lives would be saved.

Cost Effectiveness

In a May 1985 issue paper, "Mandatory Safety Belt Use Law for Wisconsin", the Wisconsin Department of Transportation provided an analysis of the benefits and costs estimated for adoption of a mandatory seat belt use law, installation of automatic seat belts, and air bags. The estimates are:

Reductions in injuries and deaths associated with adoption of a mandatory seat belt use law would save between $408 million and $1,339 million by the year 2000 and cost only $15 million in current dollars. The low figure is based on Canadian experience. The high figure is based on a 60% compliance rate estimated by the National Highway Traffic Safety Administration.

Automatic seat belts would cost about $167 million and save $219 million in injuries and deaths during the same period.

Using automobile industry estimates of the cost of air bags, air bags would cost $920 million and provide $364 million in benefits. As a result of this analysis, a mandatory use law was judged the most cost effective way of saving lives.

It should be noted that the analysis by the Wisconsin Department of Transportation examined only direct costs and benefits. It did not include the impact of various systems on employment or on insurance costs, for example. The analysis, of course, cannot measure intangibles like pain or the loss of companionship.

The study also contains a variety of information on seat belt usage and accident experience compiled from the department's accident data.

Advantages and Disadvantages of Restraint Systems

The effectiveness of each type of restraint system is affected by advantages and disadvantages specific to that type of system.

Air bags. The major advantage of air bags is that they are completely unobtrusive and, assuming no defects, protect 100% of the front seat occupants in cars in which they are installed. They are very difficult to incapacitate even if the owner wished to do so. A major problem with air bags is that they are designed to deploy only in head-on collisions. In an accident in which cars strike at right angles, the air bag will not deploy and offers no protection. Even in a head-on collision, in some circumstances a person can slide under an air bag. These factors explain why an air bag alone was judged by the U.S. DOT to be less effective than a combination lap and shoulder belt. Other suggested disadvantages include accidental deployment causing the driver to lose control of the car; more reckless driving because of overconfidence on the part of the driver; and failure to replace fired air bags after use, resulting in a gradual decrease in coverage. Automobile reprocessors worry about the toxicity of the firing canister, which could be broken in the process of junking the car, and there is some concern about harm to out-of-position passengers — particularly children in the middle seat — being hurt when the canister fires the air bag. This concern has been considerably reduced now that all 50 states require small children to be in car seats. Probably the major objection to air bags is their cost. Estimates of the cost of installing air bags range from $140 by a private manufacturer of an air bag system, to over $800 by each of the three major U.S. automobile manufacturers.

Automatic seat belts. The major problem cited for automatic seat belts is occupant acceptance. Any belt system leads to a feeling of enclosure. The discomfort of being enclosed in a belt and the fear of being trapped by the belt in an accident are cited as major reasons for not using manual belts, and automatic belts do little to ease these fears. Some automatic systems can be disconnected to allow quick escape, but if not reconnected they offer no more protection than existing belts. Even belt systems which cannot be disconnected can be incapacitated by simply cutting the belt. Since there is a portion of the population which will reject any belt system and incapacitate it, the U.S. Department of Transportation assumes that the most optimistic estimate of use of automatic belts would be about 70%. Automatic belts are estimated by manufacturers to cost between $45 and $200 more than manual belts to install.

Manual systems. The major problem with existing manual systems is usage. As indicated above, current usage estimates in the United States are below 30%. It seems unlikely on the basis of past experience that any voluntary program will push usage above that figure. Since voluntary compliance seems unlikely, the U.S. DOT proposed that states adopt mandatory use laws. There is, however, considerable doubt about the effectiveness of mandatory use laws. While surveys of belt usage indicate compliance above 90% in some countries, in most countries compliance is more frequently in the 40 to 80% range. Based on these surveys, the U.S. DOT estimates seat belt usage

under mandatory use laws at between 40 and 70%. But even if this estimate is accurate, there is some evidence that the increase in seat belt usage is not matched by an equal decrease in fatalities.

Mandatory Use Laws in Other Countries

According to the Highway Users Federation for Safety and Mobility, 30 foreign countries have mandatory seat belt use laws. In 1970, Victoria, Australia, became the first major jurisdiction to enact such a law. France and Switzerland both repealed seat belt laws and then reenacted them at a later date. A study by Peat, Marwick, Mitchell and Company indicates that the average usage of seat belts in 17 countries with mandatory usage laws increased from 23 to 66%, with an average increase of 43% after enactment of mandatory use laws. Almost all the countries in their study at least doubled their usage rates. The report gave several reasons for higher usage rates: 1) the level of police enforcement, 2) the natural propensity of individuals to obey the law, 3) the individual's personal perspective on safety.

One of the highest usage rates reported in any country is the 95% compliance in Great Britain. Usage there was 40% prior to passage of a mandatory use law. At the end of the first 11 months after passage of the mandatory usage law, fatalities among front seat occupants were 23% lower than during the same months of the previous year. The British Department of Transportation estimated that about 500 lives were saved. This actual saving of lives was, however, considerably less than would have been assumed on the basis of the reported increase in belt usage.

Canadian experience is usually thought to provide a good analogy for what will happen in the United States because there are so many similarities between the two countries. Recent observation in 5 Canadian cities provided usage estimates ranging from 41% in Windsor to 73% in Ottawa. Canadian researchers suggest that seat belt usage rates there are highly dependent on enforcement. A program of increased enforcement in Ontario in 1978 appears to have increased usage from 54 to 65%. Quebec increased the fines for failure to wear seat belts in 1982, and this appears to have been responsible for increasing usage from 40 to 68%.

As in Great Britain, however, the Canadian experience indicates that the reduction in fatalities has been less than expected based on the reported increase in seat belt usage. A study of 4 Canadian provinces found a fatality reduction of 11%. Researchers suggest that the drivers most at risk of having an accident are the least likely to wear seat belts even if required to do so by law. Canadian surveys indicate that males use seat belts less often than females. Younger drivers use them less than older drivers and usage decreases at night. In each case the category with lower observed seat belt usage matches the higher risk category.

Mandatory Use Laws in the United States

Beginning with New York which passed the first U.S. mandatory seat belt use law, effective on January 1, 1985, 27 states have passed laws requiring motor vehicle occupants to use seatbelts. Two states, Nebraska and Massachusetts, repealed mandatory use laws in statewide referenda in November 1986, leaving 25 states with laws. Nevada has also passed a mandatory use law, but it will not go into effect unless the state is allowed to raise its speed limit to 70 miles-per-hour. Only 8 of the states with mandatory usage laws have what are called primary enforcement laws which allow law enforcement officers to stop and ticket a motorist solely for failing to use a seat belt. The other states have secondary enforcement laws which allow a motorist to be ticketed only if stopped for some other infraction.

As of March 31, 1987, the following states have passed mandatory use laws: New York, New Jersey, Illinois, Michigan, Texas, Missouri, North Carolina, Hawaii, New Mexico, Connecticut, California, Tennessee, Utah, Ohio, Washington, Maryland, Louisiana, Iowa, Idaho, Kansas, Florida, Minnesota, Oklahoma, Indiana, Virginia. States are listed in order of passage. Laws in

Indiana and Virginia do not take effect until July 1, 1987, and January 1, 1988, respectively. These 25 states comprise about 72% of the population of the United States.

While this constitutes more than the two-thirds of the population necessary to rescind the U.S. DOT rule, there is some doubt as to which of the 25 states should be counted toward rescission. Several states have purposely failed to meet all federal requirements. For example, the Illinois law does not include a provision that damages resulting from accidents can be lowered if the injured person is not wearing a seat belt. The New Jersey law includes a maximum fine of $20 rather than the $25 stipulated in the federal rule. Some proponents of air bags are suggesting that states should deliberately fail to meet one of the federal requirements when adopting a mandatory use law so that the automatic restraint rule must be imposed, and the safety benefits of both approaches are provided. North Carolina's law will lapse if the U.S. automatic restraint rule is adopted. As noted above, the three-judge panel did not think any of the first 20 states to pass mandatory use laws met the federal standard. U.S. DOT had not certified any state law to be in compliance as of April 1, 1987.

Seat belt usage varies greatly from state to state. New York has had a seat belt usage law longer than any other state. Before passage of the law, a September 1984 survey showed usage varying from 8% in one small city to 30% for intercity travelers. Two years after passage of the law, in January 1987, usage varied from 37% in the Westchester area of the Bronx to 63% in the small city of Elmira. Usage has remained about the same for the last year. California usage was observed between 57% on major intercity routes to a low of 32% in a small city. In Texas, researchers reported usage ranging from 43 to 69% in the fall of 1986. North Carolina reports a change in usage from about 25% to 78% of front seat occupants. This appears to be the highest usage rate in the nation. In contrast, Nebraska, which repealed its mandatory usage law last November, dropped from 40% usage in October 1986 to 29% usage in February 1987. Some evidence suggests that level of enforcement and penalties affect usage rates in the U.S. as they do in Canada.

Data on seat belt usage in Wisconsin is based on information gathered from accident report data rather than from observations of all automobiles on the road. The Wisconsin Department of Transportation, Bureau of Policy Planning and Analysis, found that between October 1985 and October 1986 about 30% of accident victims were using seat belts. This substantiates field surveys that report that about 34% of vehicle occupants wear seat belts. The 1986 data indicates an increase from the 16% of accident victims found to be using seat belts in 1983. Wisconsin DOT suggests that likely factors in the increased usage are public awareness of benefits, mandatory use laws in surrounding states and use requirements by some businesses, an increase in the number of older drivers and the requirement that children be restrained which may affect parental behavior.

The Wisconsin DOT data also indicates that individuals are more likely to be injured if not wearing a seat belt. They found that 18% of nonusers were injured compared to 12% of users. Only 10% of the fatal injuries were incurred by seat belt users, 37 of 352 fatalities. Only 17% of incapacitating injuries involved belted occupants. Wisconsin accident data also shows that usage is lowest at night, on weekends, on town roads and by young drivers.

As in other countries, reduction in deaths on U.S. highways after passage of mandatory use laws does not match the increase in usage of seat belts. A study prepared for the Insurance Institute for Highway Safety by Adrian Lund, Paul Zador and Jessica Pollner in August 1986 examined 4 states which had seat belt usage laws in effect for at least 6 months during 1985. Compared to similar states with no mandatory use law, fatalities decreased in Illinois by 5%, in New Jersey and Michigan by 4% and in New York by 17%. Only the New York decrease was statistically significant, however. The researchers estimate that seat belt usage laws in the 4 states were responsible for preventing 250 to 300 deaths in 1985. They also suggested that the tougher enforcement provisions in New York accounted for the greater success of that state's law in reducing fatalities.

Wisconsin Bills

In the 1985 legislative session, 4 bills relating to seat belt use and one bill relating to air bags were introduced. SB-7 passed the Senate but was not reported out of committee in the Assembly. All the other bills died in committee.

Senate Bill 46 would have required that beginning with the 1988 model year no person could sell a new automobile to a Wisconsin resident at retail unless the resident was offered the option of having airbags installed in the vehicle. The bill was introduced by Senator Risser and others.

Senate Bill 7, Assembly Bills 117, 122 and 132 would have required seat belt usage.

As indicated, 5 bills relating to seat belt use have been introduced in the 1987 legislative session. Senate Bill 7 has passed the Senate and is currently in the Assembly Committee on State Affairs. None of the other bills had been reported out of committee on April 1, 1987.

Assembly Bill 7, introduced by Representative Vanderperren and others, would require that the person operating a motor vehicle and passengers not already required to be properly restrained, be properly restrained. Failure to comply would result in a forfeiture of $10. The law would remain in effect until June 30, 1989. The Wisconsin DOT could not assess points for violations. Assembly Bill 48 introduced by Representative Vanderperren is similar, but applies only to front seat passengers. Assembly Bill 164 introduced by Representative Merkt is similar to AB-7 and AB-48, but contains a forfeiture of $25 and stipulates that police officers may not stop an operator solely for failure to wear a safety belt. Assembly Bill 56 introduced by Representative Travis and others would require a person holding a probationary license or who is under the age of 18 to be properly restrained.

Senate Bill 7, introduced by Senator Czarnezki and others, is similar to AB-7. The Senate adopted amendments as follows. Senate Amendment 1 stated as legislative intent that the bill not be counted towards the population necessary to prevent installation of automatic restraints under the federal regulation. Senate Amendment 3 exempted emergency vehicles driven by a law enforcement officer where compliance could endanger the safety of the operator or another. Senate Amendments 4 and 11 exempted farm trucks being used off highways in conjunction with the planting and harvesting of crops. Senate Amendment 8 limited the operator's responsibility to ensure that passengers are using seat belts to those under the age of 16, and over the age of 3. The bill passed the Senate on March 17, 1987 on a vote of 21 to 9.

Sources

Benguerel, Yvette, "Mandatory Seat Belt Legislation: Panacea for Highway Traffic Fatalities?", *Syracuse Law Review*, v. 36, 1986 (380.7251/B43).

Huelke, Donald F. and others, "Effectiveness of Current and Future Restraint Systems in Fatal and Serious Injury Automobile Crashes", Society of Automotive Engineers, Inc., 1979 (380.7251/So1).

Insurance Institute for Highway Safety, "Air Bags: A Chronological History of Delay", 1984 (380.7251/In7f).

Lund, Adrian K. *et al.*, "Motor Vehicle Occupant Fatalities in Four States with Seat Belt Use Laws", Insurance Institute for Highway Safety, August 1986 (380.7251/In7e).

National Conference of State Legislatures, "Mandatory Seat Belt Laws — State/Federal Controversy Brewing", by Sharon Lawrence, March 1986 (380.7251/N21).

United States National Highway Traffic Safety Administration, "Federal Motor Vehicle Safety Standard", *Federal Register*, July 17, 1984 (380.7251/X14).

United States Senate, "Hearings before the Subcommittee for Consumers of the Committee on Commerce, Science, and Transportation, United States Senate, Ninety-Fifth Congress on Department of Transportation's June 30, 1977 Passive Restraint Rule" (380.7251/X4/94-1977).

United States Senate, "Hearing Before the Subcommittee on Surface Transportation of the Committee on Commerce, Science and Transportation, United States Senate, on Motor Vehicle Safety and the Marketplace" (380.7251/X4/98-1983).

United States Supreme Court, *Motor Vehicle Manufacturers Association v. State Farm Mutual*, 103 S.Ct. 2856 (1983).

Wisconsin Legislative Reference Bureau, *Clippings*, AUTOMOBILE SAFETY EQUIPMENT (380.7251/Z).

Wisconsin Department of Transportation, "Mandatory Safety Belt Use Law for Wisconsin", May 1985.